RAILROAD GAZETTE

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The Principles of Blasting.

BY HENRY S. DRINKER, E. M.

[*Continued from page* 218.]

DISCUSSION OF VOLUMES THROWN IN BLASTING.

When a hole is bored in a vertical face of a solid rock in the direction of the line $a\ b$ (Fig. 63) and fired, if the tamping is not well rammed, the shot will probably simply blow out or only loosen a comparatively small portion of rock. If the tamping be well rammed, and the rock good, favorable material, a conical body—the so-called *crater or funnel*—will be thrown out; for which, with black powder, the radius of blasting, $b\ c = b\ d$, may be assumed, for discussion, to be about equal to $a\ b$; we will call $a\ b = A$ = line of least resistance. In this blast, therefore, a conical mass of rock would be thrown out, the volume of which, V, may be approximately expressed by

$$V = \frac{t^3\,\pi}{3} = 1.05\,t^3.$$

Hence, the volume of the mass blasted is as the cube of the line of least resistance.

This formula, however, applies merely to a plain, open face in good rock; considering still that we are treating of unfissured average ground, let us then consider some of the cases where two or more faces may be acted on by the charge. Take a cube freely suspended in the air, with a charge of powder at its centre. On firing (in a homogeneous material of course), the gases developed meet with equal resistance in the direction of the six faces, and theoretically there will be six craters, with the corresponding corners also broken.

A short computation will show how the total volume of broken ground increases with the number of open faces, in a ratio that is rather more favorable than a direct proportion. This, though only a mere theoretical view, is of value as clearly placing the advantage of setting holes to act in concert by opening as many faces as possible.

Fig. 64 shows the cube above suggested freely suspended and a charge located at its centre. We have for the volume of the crater at one face, $V = 1.05\,t^3$; for the six faces of the cube there must then be 6 $(1.05\,t^3)$ or 6 $V = 6.3\,t^3$. There are besides the eight corner-pieces, which remain after deducting the volume of the cones from that of the cube (c). As the volume of c is of course $= (2\,t)^3 = 8\,t^3$, the total cubic contents of the corners must be $8\,t^3 - 6.3\,t^3 = 1.7\,t^3$; hence a single corner $e = 0.212\,t^3$.

Now, take a solid mass (Fig. 65), with only two open square faces $d\ e\ f\ g$ and $d\ e\ i\ h$, and consider each side $= 2\,t$.

On firing a charge located equidistant from these two faces there will theoretically result two craters $2\ V = 2\ (1.05\,t^3) = 2.1\,t^3$,

But it may be assumed also that portions have been detached from the corners at d and e, say in each case one-half the corner. We may then theoretically consider that, as to a solid with two open faces, the volume of the blasted mass may amount to

$$2\,V + 2\,\frac{e}{2} = 2.1\,t^3 + 0.212\,t^3 = \text{say } 2.3\,t^3.$$

If we continue the computation similarly as to solids with three, four to six open faces, we will obtain the following tabular arrangement:

TABLE XIV.

THEORETICAL VOLUMES IN BLASTING WITH BLACK POWDER.

Number of open Faces.	Volumes expressed in terms of the line of least resistance t. Cone $v = 1.05\ t^3$	Corner-piece $e = 0.212\ t^3$	Tot'l in round Numbers	Volumes expressed in Terms of the depth of bore-hole l.
1	1 V	....	1.05 t^3	0.37 l^3
2	2 V	2 + 2 e	2.3 t^3	0.83 l^3
3	3 V	(1 + 3 + 2) e	3.7 t^3	1.32 l^3
4	4 V	(2 + 4 + 2) e	5.1 t^3	1.83 l^3
5	5 V	(4 + 4 + 2) e	6.5 t^3	2.33 l^3
6	6 V	8 e	8.0 t^3	2.86 l^3

If, in the above table, we make the volume blasted at one face equal to unity, and suppose the line of least resistance t to remain the same, we will find that the volumes of the several cuts for 1, 2, 3, 4, 5, 6 open faces are to each other approximately 1 : 2.2 : 3.5 : 4.9 : 6.2 : 7.6, hence *the ratio of gain in using open faces is greater than a direct one.*

Now, we have here seen the theoretical volumes thrown where cones are blown by holes set perpendicular to the face, and the calculations have been made in respect to holes set in this line, but this line $a\ b = t$ (Fig. 66.) is the line of least resistance, where there is but one face, and we have seen that bore-holes should not be located in the line of least resistance (with black powder). But we have seen further that a hole set at an angle of 45° (Figs. 67 and 55) is the case midway between the extremes of very tough and loose rock, shown in Figs. 54 and 56, and that, with an angle of 45°, the line of least resistance $= \frac{3}{4}$ of the depth of the hole, so that the same volume will apply, as it is the same figure, with the bore-hole changed in position. In this case, the volume of the cone blasted $V = 1.05\,l^3$ may be expressed in terms of the depth $a\ c = l$ of the bore. We will thus have $V = 0.37\,l^3$, since $l = 1.3\,t$ and $t = 0.71\,l$. This expression, however, it must be remembered, is merely a theoretical one designed to formulate and concisely show the essential principles of blasting. Of course, no approximate single formula could be devised that would apply to the varying positions which occur in blasting and the varying materials met with. Schoen* has, however taken $V = m\,l^3$ as a general formula, in which the coefficient m is to be varied according to the material, and he

* "Der Tunnelbau," p. 91.

presents the following values, as deduced from various trials, for m:

Values of the coefficient m in the formula $V = m\,l^3$, for different rocks:

Jurassic rock (firm)	$m = 0.38$	$m = 0.4$	On an average, $m = 0.65$.
Gneiss	$m = 0.39$		
Calcareous slate	$m = 0.41$		
Dolomite	$m = 0.41$		
Galena	$m = 0.42$		
Quartz	$m = 0.42$		
Trap	$m = 0.77$	$m = 0.9$	
Granite	$m = 0.85$		
Jura limestone	$m = 0.85$		
Calcite (calcspar)	$m = 0.96$		
Mica-schist	$m = 0.02$		

In this table, which must be accepted merely on approximation (Schoen says of it, "welche freilich nicht auf Vollständigkeit Anspruch machen kann"), m amounts to 0.4 for very tough rock, and to 0.9 for more brittle rock with one open face.

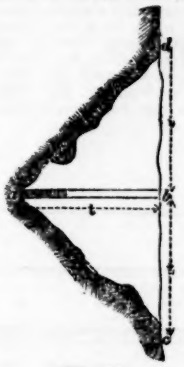


Fig. 63.

As to the width and depth of holes, they must vary with the rock and location—*i.e.*, whether in open cut, small or large heading, bottom holes, block holes, etc. The distance

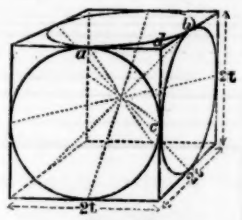


Fig. 64.

apart of the holes in a face should be so proportioned that the burden may be divided, and that, after the blast, the face rock left standing may be loosened with ease by picking and wedging.

Theoretically, the number and depth of holes required to break a face with no loss of force may thus be approximately

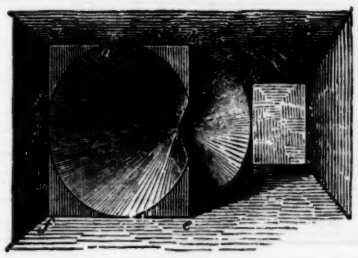


Fig. 65.

estimated. Practically, however, the location, depth, etc., of the holes required in a given rock become a matter of instinct to an intelligent blaster, after due experience gained in different kinds of rock; but the foregoing general discussion may perhaps be of value in arriving at a correct judgment by supplementing practical experience in the use of black powder with theoretical computation.

In this connection, the following extract from Schoen is given ("Der Tunnelbau" (1874), p. 103, *et seq.*). The author

Fig. 66.

Fig. 67.

of this work has had no opportunity of verifying the results set forth, nor do the tables in all points agree with the author's personal experience. They are of interest, however, as being advanced by Schoen, and they are said by him to be based on and drawn from actual practice in Europe.

The first effort of a miner in a heading should be directed toward loosening the coherence of the rock, as the latter is of course much greater in a small heading than in open work. The difficulty of working may be said to be four to five times greater in the former than in the latter case; indeed, it may safely be assumed as a rule that *the expenditure of power and money increases in the inverse ratio of the squares of the areas to be excavated.* The first loosening of the coherence of the rock is to be effected obviously at the point where the breaking-in can be performed with the least difficulty; hence at places where clefts, fissures, soft intermediate strata and the like occur.

In the following table is given the number of cubic metres of rock which a miner can blast out in an eight-hour shift in narrow areas, such as are given by, say, headings or shafts of 5 square metres (about 6 square yards) clear area:

CUBIC METRES.

Gneiss	0.044 to 0.075	Average value: 0.0692, or about 0.07, in compact and very compact rock; or, say, in rock blasted with difficulty.
Quartz	0.046	
Granulite	0.066	
Granite	0.079	
Syenite	0.076	
Porphyry	0.076	
Heavy spar (baryta)	0.076	
Galena	0.085	
Calcareous spar	0.107	Average value: 0.164 in easier and less compact rock; or, say, in rock easily blasted.
Limestone (Jurassic)	0.125	
Sandstone (red, blue)	0.126	
Dolomite	0.136	
Graywacke	(0.064)—0.142	
Gypsum	0.222	
Calcareous slate	0.224	
Clay slate	0.232	
Total average	0.114 cubic metres.	

These coefficients show very well the ratio of extraction in rocks of different hardness, and it will be seen that a miner's work in clay slate, calcareous slate and gypsum is indicated as being nearly five times greater than in gneiss. The numbers may also serve proportionally to approximately determine the amount of a miner's work in cross-sections larger than five square metres, *as for the same kinds of rock the amounts of work performed are to each other as the square roots of the areas of the cross-sections.* For instance, in excavating the full cross-section of a double-track tunnel, the area of which amounts to 42 square metres, a miner will extract during eight hours of work:

In very compact rock in which for a cross-section of 5 square metres the average work performed by one man during eight hours is 0.07 cubic metres:

$$\sqrt{5\ \square} : \sqrt{42\ \square}^{m} = 2.2 : 6.4 :: 0.07 : x$$

$x = 0.2$ cubic metre extracted = amount of material removed from the above cross-section of 42 square metres.

And

in a rock which can be easily quarried and blasted:

$$\sqrt{5\ \square} : \sqrt{42\ \square}^{m} :: 0.164 : x$$

$x = 0.48$ cubic metres extracted = amount corresponding to the area of 42 square metres.

These values of x agree very well with the results obtained in practice (according to Schoen).

ESTIMATE OF THE COST OF EXTRACTION

The following tabular arrangement contains data showing the work performed by a miner in six different kinds of rocks. The table serves also to determine the time required for extracting one cubic metre of material from the full area of a tunnel, and is based on the personal experience of J. G. Schoen and other engineers in Europe:

TABLE XV.

Kind of Rock.	Class.	(a) Amount of material in cubic metres that a miner can extract in eight-hour shifts in the different classes of rock	(b) Time required (expressed in eight-hour shifts) for a miner to extract one cubic metre of material from the full area of a tunnel	(c) Time required (expressed in eight-hour shifts) for a miner to extract one cubic metre of material in open-cut work	(d) Geometrical Series, having a common ratio 1.904	
					From column (*a*).	From column (*b*).
Soft ground	I.	6.51	0.154	0.08	6.51	0.153
Ground extracted with the pick	II.	4.08	0.245	0.14	3.34	0.29
Ground separated with the gad	III.	2.49	0.401	0.19	1.80	0.55
Rocks which are quarried	IV.	0.87	1.149	0.47	0.94	1.05
Rocks quarried and blasted	V.	0.49	2.041	0.65	0.50	2.01
Rocks to be blasted	VI.	0.26	3.903	1.04	0.26	3.846

The numbers in column (*b*), multiplied by the day's wages (eight hours) of a miner, will give *the cost of a cubic metre of excavation in tunneling*, while the numbers in column (*c*) are the coefficients which, multiplied by the wages of a good outside laborer, will furnish the cost of excavation of one cubic metre in open working. Of course, the figures for inside working are greatly in excess.

The reader's attention is directed to the remarkable fact, shown by the table, that the number of cubic metres which a miner is capable of extracting during eight hours in the six different classes of rock decreases nearly in a geometrical ratio from Classes I. to VI., while the time increases; and column (*d*) shows that this rate of increase and decrease is in a geometrical progression with a common ratio 1.904. It should, moreover, be noted that the numbers in column (*d*) are within the limits of corresponding values obtained from actual tunneling (in Europe). We have therefore the rule that the extraction of the different materials noted in the six classes specified decreases in quantity in a geometrical ratio, while the cost of extraction increases in the same ratio.

The following formulæ are given by Schoen for determining the dimensions of blast-holes and their charges with powder, referred to given areas in a rock of average character:

Let f denote the area in square metres;
- l " the depth of bore in centimetres;
- t " the length of the line of shortest resistance;
- V " the volume of the blasted material, the face being supposed to be nearly plain and open;
- d " the clear width of the hole in centimetres;
- L " the charge of powder of a hole in grammes;
- Z " the length of the fuse in centimetres;

we will have:

(1) l cmtrs. $= 20\ \sqrt{f}$ (more acurately, $= 20.18\ \sqrt{f}$).
(2) t cmtrs. $= 14\ \sqrt{f}$ (more accurately, $= 14.3\ \sqrt{f}$).
(3) V cub. cmtrs. $= 2920\ f\ \sqrt{f}$, or
V cub. mtrs. $= 0.00292\ f\ \sqrt{f}$.
(4) d cmtrs. $= 2.34 \times 0.4\ \sqrt{f}$.
(5) L grammes $= \sqrt{f}\,(28.6 + 9.8\ \sqrt{f} + 0.8\,f)$.
(6) Z cmtrs. $= (20\ \sqrt{f}) \times 2$.
(7) $V = 1.05\,l^3$.
(8) $V = 0.37\,l^3$.
(9) d cmtrs. $= 2.34 + 0.02\,l$.
(10) L grammes $= l\,(1.43 + 0.024\,l + 0.0001\,l^2)$.

These tables and formulæ from Schoen may perhaps be of value to some readers of this work. They have never, so far as the author knows, been verified, or even discussed, in America, and their discussion alone may perhaps be a help

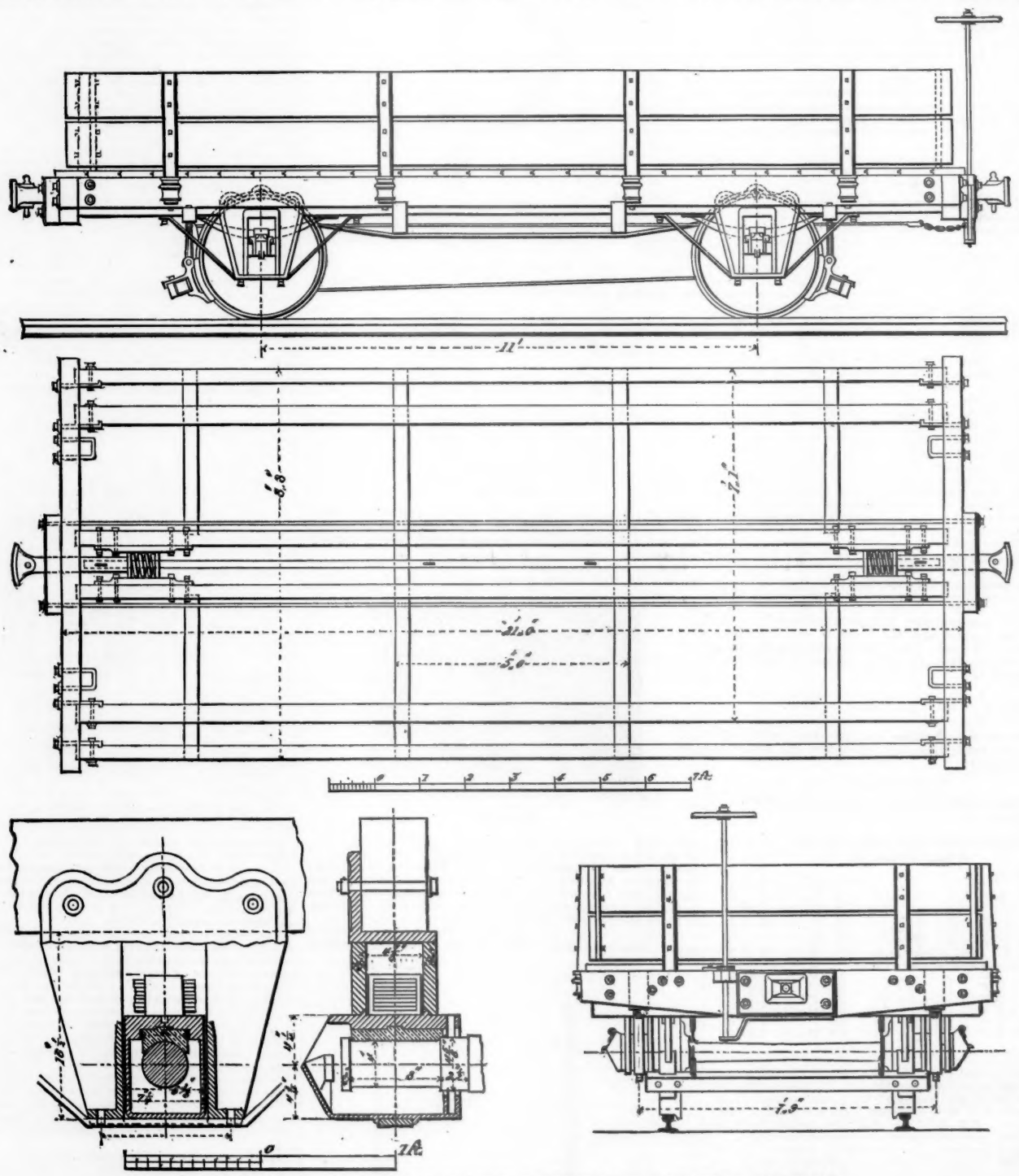
in modifying some of our rule-of-thumb principles in blasting work.

In the use of the lower explosives—haloxyline, Reveley's powder, etc., which approximate in strength to gunpowder—the circumstances are so similar that it is hardly necessary to enter into them. As to gun-cotton, it would not seem at the present day to be likely to supersede either black powder or nitro-glycerine, in their respective provinces, being mid way between the two in strength, and the lower dynamites approximate so closely to it, while in the general judgment they are so much safer to use that they are likely to occupy the place it might fill in blasting.

Four-Wheeled Coal Cars.

Our engravings this week represent a plan of four-wheeled coal car, from which the Louisville & Nashville Railroad Company has built and now has running about fifty cars. The drawings are so clear that but little description is needed. The empty cars weigh 10,500 lbs., and their capacity is 325 bushels, or 26,000 lbs. of coal. Mr. de Funiak writes that "the cars have been running about six months, making about 100 miles every day, and that they are mixed in with other cars in same trains which run at very high speeds over grades of 80 feet per mile, and continued curves of five and six degrees for six miles. They give perfect satisfaction, and they never have *hot* boxes under this class of cars, which shows that the load, size of journal and bearing surface are properly proportioned."

Attention is especially called to the size of the journal, which is 4×8 in. Those who have opposed the adoption of the Master Car-Builders' standard axle, because it was said to be too large, would perhaps do well to examine into the working of these axles. The use of so large an axle as that adopted by Mr. de Funiak, makes one long for the day when car mileage will be accurately kept, and reports of hot boxes will be made regularly. As we took occasion to say before, if railroad companies would *order* the publication of correct reports of hot boxes, it would take but a short time to have the annoyance from that cause reformed out of existence, or, at least, to diminish the evil to such an extent as to make it hardly appreciable.



FOUR-WHEELED COAL CAR, FOR THE LOUISVILLE & NASHVILLE RAILROAD.

F. DE FUNIAK, *Chief Engineer and Superintendent of Machinery.*

The Department of Permanent Way and Works on English Railroads.

The engineer is the head of this most invaluable scientific branch of railway service. He is charged with the construction and the maintenance of the line and all relative works, and is responsible for the safe condition of bridges and station premises, and also for the smooth working of points and signals. If he is active and conscientious, it is not difficult to perceive that he must be a busy man, and that official cares must frequently press heavily, following him home and disturbing his rest. This we have had occasion to say of other officers; and we may say here that all railway officers engaged in working the traffic over the line, or in keeping that line in good working order, are more or less subject to anxiety, by night even more than by day, lest something should go wrong. The engineer is no exception to this rule, as, even when his personal supervision is close and constant, unexpected flood may imperil, if it does not carry away a bridge here, or wash away an embankment there. In times of frost rails are in danger of fracture. Sudden thaw after severe snow and ice endangers embankments on the sides of mountain ranges, by splitting boulders on the heights and precipitating hugh masses of rock on the line, or it cracks the rocky walls of deep cuttings, and renders the passage of heavy trains at high speed perilous. Heavy rains overload sand and clay embankments, and they slip and block the line. Snowdrifts in open moorland or mountainous districts have the same effect. The inner walls and roofs of tunnels, whether built or formed of the natural rock, from the same or relative causes, give way, often without warning, and not only impede traffic but render traveling unsafe. These and a thousand and one minor accidents, only looked for in a general way, and all possible, as we have said, under the most careful supervision, are cause of special anxiety to the engineer, and he is happily constituted if he can maintain an ordinarily cheerful disposition and divest himself of bogus terrors, possessing his soul in calmness till the hour of trial arrives.

On all railway systems the initial duty of the engineer is to make survey of the ground over which a line is proposed to be laid. To advise the promoters as to cost, and as to the cheapest, because the most serviceable, route for catching traffic, looking also to ease of construction; to prepare plans and sections, with maps, for Parliamentary warfare; and to be in his place, as a principal witness, before Parliament, when the bill comes before that tribunal—all this he does in concert with the company's solicitor, and, in the later stages, with their Parliamentary agent. In the earlier stages the utmost care is required lest the "standing orders" should be in the smallest detail neglected. Careleseness in the initiatory stages is certain to prove fatal to the project, and to the engineer's opportunity of proving his quality as a witness, because the bill runs the risk of being rejected by the examiner. If he is lucky enough to have performed his work carefully, it precedes him to the committee room, where he meets it in enlarged form on the walls, and he passes examination on it, and then cross-examination. Here he is happy if he escapes without loss of temper, since he is certain to be assailed from all points by counsel anxious to make good the opposition views of their clients, and their reputation as sharp fellows. Some of our engineers are witnesses of the first water. Full of their case they offer nothing that is not wanted, and sometimes baffle the chaffing counsel on the opposition side by their coolness, firmness and self-possession.

The bill having been obtained, the engineer's next duty is to draw out detailed specifications, with working plans, for the contractors to be selected for the construction of the line. It is matter of considerable satisfaction to the companies, and cause of just pride on the part of our engineers, that so little discrepancy occurs, as a rule, between the estimated and the actual cost of making our lines, and it proves the care and the technical skill of these officers that results so nearly accurate can be arrived at, as it were, hypothetically. Parliamentary committees are not prone to pass the

preambles of bills for the construction of *expensive* works, so that there is a tendency on the part of promoters to prov that their lines are to be constructed for a mere bagatelle, and their engineers are, therefore, prompted to prove this by a process not unlike that of *undervaluing*. That it should, under such a system, therefore, so seldom be necessary to apply for further money powers in subsequent sessions, is, as we have said, in the highest degree creditable to our engineers. In preparing plans for the works, the engineer has to design station premises at roadsides and at termini. Those at the latter are, in the nature of things, required to be expressive, as well as commodious and suitable, so that our officer, skilled in lineal and cubic measurement, must develop equal knowledge of, and skill in, the art and science of architecture. He has to prepare *working* plans of the whole works, to design the bridges—stone and iron—to consider the strain the latter may be required to bear, and to make provision; to specify the quantity of excavation needful, to indicate, where he can, whether that be of rock or earth, also the quantity of earth required for filling up, where low ground has to be embanked; to indicate the weights, and give sections of the rails to be used, and to work out the plans of all crossings, and through shunts; to lay out all mineral and goods yards, and to arrange the working of points and signals—all this, and probably much more which we may have overlooked, the engineer has to do, preparatory to the issue of advertisements for "tenders" for the works. When these latter are received and opened they are handed to the engineer for his report upon them, and the directors or promoters usually act upon his advice, and accept the offers which he recommends. The contracts for works having been closed and the work of construction begun, the engineer and his assistants become inspectors for the nonce, taking oversight of the work at various points in order to its being faithfully performed, and also in order that they may be able to certify for the contractors' periodical payments. All iron-work, girders, pillars, brackets, rails, upon which there is likely to be *strain*, is tested by the engineer's staff before being accepted, so that the risk of slop work, where so much life and property are at stake, is reduced to its minimum. When the whole works are completed, and the government inspection passed, a process, by the way, not so easy as might be expected, after such care in planning and constructing, but one in which the officer appointed by the Board of Trade has to satisfy himself that the construction is sound, in theory and in fact, that signals are properly seen at certain distances, and that traveling on the line is theoretically safe, the company receives from the Board of Trade a formal sanction to open the line. For twelve months after the completion of the works it is the duty of the contractor, under stipulation of most deeds of contract, to maintain the works. After the expiry of that period, their care and up-keep, hitherto a *capital* charge, being now transferred to the company and the company's engineer, or permanent way and works department, become chargeable upon *revenue*.

When the line has been opened, and traffic is yielding revenue, and in its passage is finding out the weak places in the materials or faults in construction, or is *developing* beyond expectation, the engineer and his staff are, as we stated in the beginning, fully employed with sufficiently engrossing and anxious work. Conditions of the weather affect some of the materials. Some portions of the line are more liable than others to get out of order, either by reason of there being a greater rush of traffic between certain points, or because of something faulty in the nature of the ground over or through which those portions have been laid, or, as in the case of tunnels, the roofs, walls, rails and sleepers are subject to constant deterioration by water dripping or oozing through.

Charged with such duties, and laden with so many and grave responsibilities, it seems needful that the engineer should be a man fertile of resource. To this end he must be of broad culture, master of the *theory* of his profession, and having a thorough experience of its practice. In a great engineer these are as inseparable as the Siamese Twins. Theoretically, he may be able to calculate strains and deflections to a demonstration, but that which looks well on paper does not always, or necessarily, turn out well in working. It will therefore be manifest that an engineer, to be successful, should be master also of the practical part of his profession. He must know enough of the manufacture of iron-work of all kinds, needful to the construction and repair or replacement of works, to enable him to judge of its fitness for its purpose. He must have sufficient experience of mason and joiner work to check the use of insufficient materials, or the employment of fair materials in a way not provided for in the specification. If he is not an architect he must employ one to design station and offices; and it needs no demonstration to prove the great value of an accurate and scientific knowledge of that branch of his profession to an engineer. The man who possesses it is much more likely to do satisfactory work than he who has to delegate it to a specialist, and he will do it with greater pleasure to himself. The employment of an architect implies many consultations with one who has no technical or special acquaintance with railway requirements, and consequently cannot design so accurately; and it also supposes possible conflict of opinion, and therefore delay and worry. Most of our handsome station premises in the country are the work of our engineers, and, in their taste and completeness, are a memorial of their capacity. In the work of laying out new lines, an engineer who is a geologist will derive much aid from that science. He will know something of the sub-superficial condition of the country through which his line is projected. The solid contents of its mountain ranges will be comparatively familiar, and the causes and character of the undulations on its valleys will be an open book to him. From this scientific standpoint he will be able to avoid projecting his line through ground which would require hard or heavy excavation, and where that is unavoidable he will be better able to estimate the cost of excavation through rock or clay, the character of which he is in a position to describe without the expense of boring. Geology is of still greater use to the engineer in spanning rivers and arms of the sea, as, the character, the depth and dip of the sub-aqueous bed being to a certain extent familiar to him, he can the more readily ascertain and gauge the difficulties to be encountered in sinking his piers. We do not say it is *necessary* he should be a geologist, we simply affirm that he who *is* is a much more valuable engineer—other things being equal, of course—than the man who is not. The broader the culture, as we have remarked, the greater the chance of success, the greater the independence and the higher the authority. The engineering mind is essentially scientific, so that *all* science, especially such as has any bearing upon his profession, must be attractive; and it would be more wonderful to find him negligent than well furnished in that direction.

In describing the engineer, we are to be understood as including the district engineers of the more extensive systems and the principal assistants. The same high and broad capacities must be there in full operation, or only waiting opportunity for display. Otherwise the enormous and onerous work of the department could never be overtaken. In their districts the district officers conduct all operations which do not materially affect the dividend-paying capacity of the line, such as repairs, slight alterations, and general maintenance, having charge of their own staff. Where there are district engineers, the chief acts as a kind of consulting officer, whose head and hands are free from the worry of petty details of ordinary maintenance. Where there is no such sub-division of responsibility, the principal assistant takes charge of all but the greater questions of extension, remodeling, etc. He superintends the whole staff, both of assistants and of workmen out of doors. He trains the apprentices, distributes the work to draughtsmen, inspectors, etc., and supervises the technical work of the office generally. There is one qualification in which he should excel. He should be a correct and ready draughtsman. His influence over the staff in the office will be greatly increased if he possesses this undoubtedly useful accomplishment in common with those others to which we referred in describing the engineer. He should also be a wise and prudent administrator, capable of selecting the best men for every class of duty, and of commanding their esteem. It is from the ranks of these junior officers that the engineers who initiated the railway system, and are dropping out of the muster-roll, are from time to time replaced. *That* is their incentive to hearty work. Equally, it is from the ranks of the junior assistants, usually all qualified engineers, and the apprentices, as the latter complete their course of studies and their period of active service, that the principal assistants' successors are draughted, and *that* is *their* expectation, if, indeed, by great diligence and application they do not hope to reach the highest place. The work of the engineer's office demands a variety of accomplishments in the members of the staff. They must be *students*, but they must not grudge to be workmen also. They have to undergo fatiguing work in the fields, surveying and leveling in all weathers. They must be able to sustain vigorous life, ever and anon, as occasion requires, on such food as moor and moss and mountain-side offer, and they require to bend themselves nearly double over their drawing boards, straining their eyes over the drawing of plans with lines of most trying compactness, or they have occasion to go on hands and knees on the floor over drawings on a larger scale, till knees and back and eyes are fain to complain. Many of these fine fellows are to be found at the arduous field or office practice of their profession during long terms, and yet find time and brain for study of its science, its hard-headed theory. These are the men who cleave their way to eminence. The laggards rarely rise above the level of scarcely very reliable draughtsmen. Mathematics, engineering and drawing are among the essential studies of an apprentice who would excel, and these may be conducted either simultaneously with the practical office and field work, or, better still, when it can be done, before entering upon the practical.

The department requires a staff of clerks and book-keepers for necessary correspondence and the due care of the expenditure. This portion of the staff is presided over by a principal commercial assistant.—*The [London] Railway Sheet.*

American Institute of Mining Engineers.

Under date of May 1, the Secretary, Prof. Thomas M. Drown, has issued the following notice of the annual meeting:

The Council of the Institute has accepted the courteous invitation of the Iron, Coal & Manufacturers' Association, of Chattanooga, Tenn., and has decided to hold the annual meeting in that city, beginning Wednesday evening, May 22, the regular date of the meeting being anticipated in accordance with the authority given by the Institute at the last regular meeting.

The President of the Association has, with the coöperation of his associates, arranged a most attractive programme of excursions.

A trip down the Tennessee River is contemplated, amid the magnificent scenery of the rapids where the river cuts through the Cumberland Mountains, stopping at the Dade coal mines, among the largest in the South, thence to South Pittsburgh, where the Southern States Coal, Iron & Land Company, Limited, are putting up two 20-foot furnaces, and to the mines of iron and coal in the neighborhood.

There will also be an excursion to the Roane Iron Works, at Rockwood, passing on the way some fine mines of red fossiliferous iron ore. Another excursion is arranged to pass through the hematite ore districts of Georgia and Aalbama, when opportunity will be offered to visit the Woodstock, Stonewall, Tecumseh and Cherokee furnaces. Of historic interest are the battlefields of Chickamauga, Missionary Ridge and Lookout Mountain, to which excursions can be made.

Chattanooga can be reached from Washington *via* the Washington City, Virginia Midland & Great Southern, the Atlantic, Mississippi & Ohio, and the East Tennessee, Virginia & Georgia Railroads; from Louisville, Ky., *via* the Louisville & Great Southern Railway, and from St. Louis *via* the Nashville, Chattanooga & St. Louis Railway.

The Virginia Midland Railroad offers tickets to members from Washington to Chattanooga and return at $31.35, which may be procured at No. 601 Pennsylvania avenue, or at the Baltimore & Potomac depot, Washington, from the 18th to the 21st inst.

The Nashville, Chattanooga & St. Louis and the Louisville & Great Southern railroads offer excursion tickets to members to Chattanooga and return at three cents per mile each way, and the Louisville, Cincinnati & Lexington Railway offers tickets to members from Cincinnati to Louisville and return at $5.

The hotel charge in Chattanooga will not exceed $1.50 per day, and members can be entertained at private houses, if they prefer. It is expected that a large number of ladies will attend the meeting and take part in the excursions.

It is desirable that it should be known in advance how many expect to attend the meeting and by what route they will go. Members are requested therefore to give notice to the Secretary of their intention to attend the meeting.

Members are also requested to notify the Secretary of their intention to read papers at this meeting.

The Preservation of Wood.

[April meeting of railroad men and others at the rooms of the Master Car-Builders' Association, New York.]

The usual meeting was held at this place on Thursday evening, April 25. Mr. Garey, the President, presiding. It was expected that Mr. Hill would read a paper on the substitution of iron for wood and wood for iron in the construction of cars, but he was unable to be present as announced. The Association was fortunate in securing the services of Mr. Andrews, of Boston, who addressed the meeting on the preservation of wood.

He said that he had erected works in Boston for creosoting timber and expected soon to do the same thing in New York. At present he was taking care of works in Elizabethport, and in thirty days he expected to be at work there.

The cause of decay in timber, he said, was primarily due to the fermentation of albumen in the sap. It contains a large proportion of albuminous matter. While the trees are growing it circulates freely, but when they are cut down the wood and sap are full of albuminous matter. If there is heat and moisture present it begins to ferment immediately, and that is the condition in which wood is generally received in this country. Timber is seldom prepared for any important work in advance. If it is decided to build a bridge the trees are cut down and given to the saw-mill, and it is then put into the structure. The same is true of railroad ties and almost all the important uses to which wood is put.

The different processes to which wood is subjected for its preservation may be classed under the use of metallic salts or creosoting oils. The use of metallic salts, or the process called Burnettizing, is that which is most known in this country. If timber was used only for inside construction, Burnettizing would answer very well; but it does not protect wood thoroughly from moisture or water.

He then described very fully the process which he uses for creosoting timber at his works in Boston, but as we hope to give a full account of this process, with illustrations of the appliances used, we will defer a description of the process until then.

After Mr. Andrews' address there was some discussion, when the meeting adjourned.

Contributions.

Railroad History.

CLEVELAND, May 6, 1878.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I can indorse most feelingly your closing remarks upon the Lake Shore report, as to the insuperable difficulty the historian of the future will meet in writing up the history of our railroads. Think how much material was destroyed by the great Chicago fire!

In hunting for some facts for my history of the old Michigan Southern, I found the Detroit *Free Press*, also the *Tribune*, had lost all their files by fire. I found the same state of things at Erie, in getting some facts as to the Erie & Northeast earnings, before the Erie war.

Strange as it may seem, there is not a complete set of reports of the Cleveland & Toledo Railroad (1853–1867) in existence. I was obliged to borrow a report here and another there, and after getting my facts and figures, return the reports to the owners. This office building is surrounded with wooden structures, and had it been burned before I made up that condensed report, a large portion of it would have been forever lost. Now it is safe, being printed and scattered all over the country in thousands of annual reports. This experience has taught me, too, how easily a company may dispose of all its reports, and I have hid away in our Chicago vaults one hundred copies of each of our annual reports (L. S. & M. S.), a veritable bonanza for the aforesaid historian, who will bless me when he strikes it.

I wish I could impress the officers of other great consolidated companies with the importance of rescuing their rapidly perishing early history. While they may know all about it, the next generation will not, and they will be surprised to find how fires and deaths have piled up obstacles that will soon be insurmountable.

Let me close with one illustration: In making up that table of earnings for 41 years—1837–1878—I was stumped at the outset to obtain the earnings of the little Erie & Kalamazoo Railroad for 1837. After considerable correspondence, I hunted down a file of the Toledo *Weekly Blade* for 1838, and there found, copied from the Albany *Argus*, a full report for the year 1837. I inclose it, and hope you can make room for it. No weary miner ever experienced a more intense thrill of joy in finding the precious shining metal upon his pick than I did when I found this. Had that file of papers got lost or burned (it was in the residence of a private citizen here in Cleveland), I would have been "busted" as a historian at the outset.

C. P. LELAND.

[Toledo *Blade*, Feb. 28, 1838. Copied from Albany *Argus*.]

REPORT OF ERIE & KALAMAZOO RAILROAD.

Earnings, 1837	$55,821.52
Expenses, 1837	14,181.52
Profits	$41,610.00
Construction account	$257,659.73

Profits equal to 16¼ per cent. on investment in a very blue year [following the revulsion of 1836].

It may be remarked that this road is made through a new country, and, when constructed, the route was an almost entire wilderness, as it is now for a considerable part of the way.

That after it was put in operation it was used with horse-power only, till some time in June last, when one locomotive [the "Adrian," Baldwin, No. 80], was placed on the road, and a second one ["Toledo," Baldwin, No. 90], in September last.

The profits of the road have principally, if not entirely, accrued since the locomotive was put on, as the expense of running with horses, during the autumn of 1836 and the spring of 1837 (with the small amount of business before the navigation of last spring opened on Lake Erie), was about equal to its earnings.

If business shall revive with the opening of navigation next spring, and shall continue as prosperous as may reasonably be expected during next season, it is believed that the road will pay all expenses, and earn 50 per cent, or nearly so, of its cost, by the 31st of December next.

Note by Compiler.—Business failed to revive (as is generally the case), and the earnings ran down from $55,821 in 1837, to $25,114 in 1842, when Willard J. Daniels was appointed Receiver.

Metallic Packing.

We are informed that engine No. 34 on the New York Central & Hudson River road, which is supplied with the packing made by the United States Metallic Packing Co., of Boston, has run 101,556 miles, without having the cylinder packing touched. It continues to work perfectly steam-tight, and is apparently good for many miles more. The piston rod is in excellent condition, smooth, polished and showing scarcely perceptible wear.

RAILROAD GAZETTE

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CONTENTS.

EDITORIAL ANNOUNCEMENTS.

Passes.—*All persons connected with this paper are forbidden to ask for passes under any circumstances, and we will be thankful to have any act of the kind reported to this office.*

Addresses.—*Business letters should be addressed and drafts made payable to* THE RAILROAD GAZETTE. *Communications for the attention of the Editors should be addressed* EDITOR RAILROAD GAZETTE.

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies, the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

THE CHICAGO & ALTON.

We published a great part of the report of the President of this company in our issue of March 1. At that time, however, the rest of the report, containing the bulk of the statistics of traffic and expenses, had not come to hand; and now that the company has put upon the market a new issue of bonds to meet the cost of the Kansas City extension, it will be well to give some attention to the position of the company and the fluctuations of its business for the past few years. There was a time when people apparently did not care to examine into the stability of a company before buying its bonds. It seemed to be assumed that any promise to pay made by anything called a railroad company would be good, whether the company's property was profitable or not, or even whether it had any or not. for in those days companies sold bonds before they had any road or any other property than a charter.

But events too well known to need mention here have caused a radical change in the disposition of investors. From the extreme of confidence they have passed to the extreme of distrust. The word "railroad" now suggests suspicion, and the investor now not only wants to know that there is a solid property back of the bond offered him, and one that yields a wide margin of income beyond what his loan will require, but he also desires to be satisfied that there is no prospect of any considerable diminution of the income in the future, or none sufficient to affect his security.

The Chicago & Alton's position is in these respects extremely favorable: that its main line connects the two great cities of the West, and that it intersects the most productive coal district of Illinois. In another respect it is less favorable: that its course is across that of the great current of traffic between the East and the West. The country on its line finds the consumers for its surplus products nearly directly east of it, while the course of the road is north by east. When the Chicago & Alton has carried the freight to its eastern terminus, it has not advanced it far on its way to its final destination. St. Louis is 1,064 miles from New York by the shortest route; Chicago is 911 miles. But to advance the freight these 153 miles on its way the Chicago & Alton must carry it 280 miles. This deserves mention, because the company's reduced receipts are doubtless to some extent due to the competition of roads, many of them new ones, which afford shorter through lines to the East.

It is not always, however, that the shortest route is the most advantageous; and the Chicago & Alton has always commanded a large traffic because it was a part, if not of the shortest, still usually of the cheapest route to the East. By carrying to Chicago it enables the freight to get the advantage of lake and canal rates, which are now about one-fourth lower than the present extremely low rail rates.

It is true that the shipments of the West are not determined wholly by the cheapness of the respective routes. We must not ignore the effect of established courses of traffic and the attraction of great markets. In this case, a very large business seeks Chicago without regard to its ultimate destination. Chicago, for instance, is the great packing centre. Hogs go there to be manufactured, and will continue to do so, with very little regard to the through rates on live hogs by different routes. Chicago is also the great grain market, though the need of an intermediate grain market is felt less now than formerly, and a large diversion of traffic ensues when rail rates are as low as water rates, as is the case sometimes. Chicago, moreover, is a great selling market, and those who may ship their grain and cattle directly to the East by routes south of Chicago are still likely to purchase their lumber and merchandise in Chicago. Moreover, the Chicago & Alton has the advantage of being the line which first gave St. Louis a through rail connection to the East, and that this advantage is something more than a nominal one may be gathered from the fact that it is awarded as large a share as any other road of the shipments from St. Louis to the East, and no less than 12 per cent. of the shipments of New York to St. Louis under the plans for apportioning traffic which have been agreed to within the past year.

Still, it is evident that its position is less favorable for commanding through traffic between the East and the West than that of the Chicago roads further north. The three lines between Chicago and Omaha, for instance, are just as likely to carry the traffic, when the rail rate between Chicago and the seaboard is as low as the water rate, as when the water rate is much the lowest. Under all circumstances they form part of the shortest and cheapest route.

This company became a competitor for Kansas City business by its present route about the end of 1871. There has been no increase in the number of the competitors for that traffic since that time, though there probably has been in the competition for it. The Chicago & Alton stands substantially on an equal footing with the other Chicago roads with regard to this traffic. It was later in the field, but has a line nearly as short as any other, and apparently is satisfied with the share that it gets, as it has twice become a party to agreements which fixed that share. This is a traffic which about ten years ago was eagerly sought, and sought by too many companies at once. It grew much slower than was expected after 1871 until last year, when there was a great impulse given by abundant crops and an influx of immigration which reached its height this spring. This, doubtless, is a growing traffic, and the traffic of an enormous territory west of Kansas passes and will continue to pass that way; but it is a great mistake to suppose that there can be such a growth of this traffic as there was of that of the prairie country between the lakes and the Mississippi and between the Mississippi and the Missouri. Most of the country west of the 100th meridian is substantially uncultivable; and though a very large proportion of it is well fitted for grazing, it yet will support a comparatively small population and amount of stock in proportion to its area. The grass is good, but it is very thin. Major Powell, who is probably as well informed concerning it as any one, has recently reported officially that the minimum area of a stock farm there should be not less than four square miles, or 2,560 acres: whereas 160 acres is sufficient in Illinois or Missouri or Eastern Kansas.

If, however, the few railroads which this country will be able to support shall continue to converge on the Missouri River at and north of Kansas City, as now, they may concentrate there a heavy traffic, in course of time.

So far, the growth of business has been due chiefly to the growth of the agricultural part of Kansas, and to the Texas traffic, though the increase of cattle raising on "the plains" in Western Kansas and in Colorado has formed no inconsiderable item.

Let us now follow the course of the gross earnings, expenses and net earnings of the Chicago & Alton Company for the past ten years:

	Miles Worked.	Gross Earnings.	Working expenses.	Net earnings.
1868	368	$4,508,643	$2,463,183	$2,045,460
1869	431	4,681,563	2,676,593	2,004,970
1870	511	4,849,405	2,786,106	2,063,299
1871	526	5,278,910	3,080,825	2,198,085
1872	630	5,156,326	3,277,178	1,879,148
1873	640	5,497,541	3,376,255	2,121,286
1874	649	5,126,228	2,901,351	2,224,877
1875	650	4,656,764	2,523,257	2,133,507
1876	678	4,900,528	2,804,290	2,156,238
1877	678	4,464,343	2,457,765	2,006,578

This shows a gradual growth of earnings up to 1873, such as was general in the country (but more gradual in the case of this company than with most others, probably, considering the considerable increase in its mileage), and a decrease since at just about the same rate, so that the gross earnings of 1877 were about the same as those of 1868. The decrease has probably been greater than on the average Western road, as it has, with the Illinois Central, suffered to an exceptional extent by the competition of new roads, and the diversion of traffic from lake to rail by the establishment of low through rail rates. The country on the line of this road in Illinois has a network of railroads with very fine meshes, most of which do not pay, and have made desperate struggles to get traffic; they have not been so successful in diverting traffic from the Chicago & Alton—though they have doubtless had a great effect in diminishing the rapidity of its growth—as in reducing the rates received for carrying.

If we turn to the net earnings, however, we find the changes to have been much less. The average for the ten years has been $2,083,345. It has been once 6½ per cent. more, and once 15½ per cent. less. But only one year has it fallen below $2,000,000, which was when, we believe, about $250,000 had been paid as damages for a single accident.

It is true that these stationary net earnings come from an increasing property and capital invested; but the changes in mileage have not been considerable for several years.

The effects of competition on the Illinois traffic have probably been fully felt. There is certainly little prospect that new roads will be built there, when already they crowd each other and have mostly fallen into the hands of receivers. At the moment we recall ten such roads which the Chicago & Alton crosses between Chicago and St. Louis. On the other hand, if there is not likely to be any greater diversion of the Illinois traffic in the future than in the past, this business is not one likely to grow with very great rapidity, like Kansas traffic, for instance, or Western Iowa or Minnesota traffic under certain circumstances. Illinois must be taken out of the list of new states, in which the area under cultivation increases very rapidly from year to year. Its growth now is chiefly in its towns; these were growing fast previously to 1873, but their growth has been greatly checked since. On the average, however, Illinois is likely to have hereafter something like the rate of growth that Ohio has had since 1860—constant, healthful, greater in wealth than in population, and great in population, but moderate in proportion to what it was so long as its soil was chiefly or largely unoccupied.

When a state had reached this position, with its cultivable lands nearly all occupied and utilized to some extent, its future growth depends largely on its advantages for manufacturing. Now Illinois offers decided advantages in this respect, and has already great manufacturing industries, which are not generally recognized elsewhere in the country, because they are, naturally, chiefly for the supply of a demand in the vicinity. Illinois is third in the rank of rail-producing states, and all its rail mills are on the line of the Chicago & Alton road. Cheap coal and access to supplies of iron and timber by the cheapest of transportation enable it to undertake to advantage a great variety of manufactures. And probably there is no line in the state which has more works of the kind than the Chicago & Alton, as might be expected from its position between the two greatest cities of the West, and over the best coal in the state. So long as the state was chiefly agricultural, there was no reason why the country on this road should grow faster than that on other Illinois lines; when it becomes largely a manufacturing state, and its growth is almost entirely in the towns, then the population on the Chicago & Alton will doubtless grow much faster than the average population of the state. And the dullness of manufacturing industry, west as well as east, will account for the slow growth of traffic of late years.

For the traffic of the road has grown, though its earnings have decreased. The figures for passenger

and tonnage mileage have not always been reported, but for the past few years they have been :

	Passenger mileage.	Tonnage mileage.
1874	.....	162,306,676
1875	39,913,851	168,923,879
1876	41,231,777	217,835,161
1877	40,743,272	211,947,565

Neither traffic nor net earnings, however, will determine the security of the company's new loan. That depends upon the surplus of net earnings over the prior charges. Now the Chicago & Alton's fixed charges, though they increased materially while the company was doubling its mileage, are still unusually light. Its total capital account per mile is small, and considerably more than half of it is stock.

For the past five years the interest on the funded debt, the payments for rentals of leased lines and the surplus of net earnings over and above the sum of these fixed charges have been :

	Interest.	Rentals.	Surplus.
1873	$404,668	$515,497	$1,304,712
1874	574,490	499,366	1,151,021
1875	645,837	403,406	1,084,264
1876	590,916	441,792	1,123,530
1877	574,372	523,966	908,240

From the surplus, dividends on the stock have been made varying in amount from $1,135,080 to $926,899—10 per cent. yearly until 1876, 8½ in 1876 and 7½ in 1877.

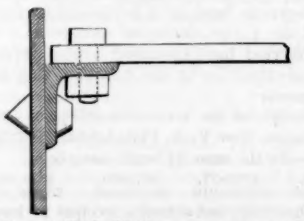
The new issue of bonds ($3,000,000 of gold 6's), will require an addition of but $180,000 to the fixed charges, or $240,000, including the sinking fund, which is but little more than one-fourth of the dividend when it has been smallest. Thus, on the assumption that the property acquired with the proceeds of these bonds, that is, the extension of 162 miles to Kansas City, will yield no net income whatever, the new issue seems to have that abundant margin which is required for a really choice security.

The influences which have reduced the earnings of this company are not likely to have more effect in the future than in the past, and they may have much less. Competition of the severest kind has now for years exercised an effect on nearly the whole traffic of this company. It can hardly be that the competition will increase, and it is reasonable to suppose that the efforts now made will materially moderate its effects in keeping down rates. It would not be prudent to count upon this effect in estimating the value of a security, but it may be right to assume that competition has already done its worst.

ELEMENTARY CONSTRUCTION.

A well-known mechanical engineer who has had many years of experience conducting a successful business, in discussing the qualifications of draftsmen remarked that what he had found most of them deficient in was a knowledge of details of construction. There can be no doubt of the fact that among all classes of mechanics and mechanical engineers a lack of knowledge and disregard of the importance of the principles of what has been called elementary construction is one of the most common deficiencies. It was this that caused the failure of the Ashtabula bridge. And investigation has shown that nearly all other bridge disasters are attributable to the same cause. It is not often that bridges built recently have any deficiency in material or show any error in the proportioning of the main members of the structure; but any bridge engineer or inspector will bear testimony to the fact that mistakes, blunders and oversights in the design and construction of the connections and attachments of one part with another are like the birds of the air in number. In fact, the science of bridge-building is now comparatively easy to learn, at least by one with any respectable amount of knowledge of mathematics; but the art is one which only years of experience, the closest observation, united with a somewhat rare mechanical instinct will make a person master of. The *science* is positive and exact, and deals with fixed quantities only, whereas in the *art* one or more reasons which govern the method of construction may often be said to be *functions* of other reasons, and it is only by assigning values to the one that the true value of the others can be determined. The first process in the train of reasoning, too, must often be a purely empirical one, and the latter, if correct conclusions are reached, will be the result of a subtile process of reasoning. The science can be, and is, taught very thoroughly by books, but the art is too complicated to be easily formulated in any written communication. There are half-a-dozen books, probably, in which the theory of bridge strains is very thoroughly elucidated, and more than that number in which the science of combustion is fully explained. The reader will, however, search in vain for any treatises which describe fully to him how he shall connect the different members of his bridge after he has determined the strains which they must resist, and we believe there is almost no literature which teaches how the grates should be arranged or explains satisfactorily the best means of admitting air above and below the fire in a locomotive boiler. Probably this lack of books on these subjects is due to the fact that both practical experience and theoretical knowledge are required to write intelligently about them, and that a combination of these is rare. There are many men who know all about the theory, but are ignorant of the practice of construction, and others who know the practice but not the theory, and still another class who know both, but who either cannot or will not write about them. For these reasons a person who seeks information about elementary construction must usually resort to methods of original research, and gather up such knowledge, in a somewhat precarious way, as he can, by picking it up through observation, or possibly evolve it out of his "inner consciousness" as experience may demand.

It has often been said that the locomotive of the present day is substantially what it was twenty-five years ago. So far as the principles of construction are concerned this is doubtless true. But as an old and experienced railroad man remarked, a short time ago, the locomotives of the present "do not break down as they used to. Twenty years ago it was a frequent and almost daily occurrence to have locomotives fail out on the line so that it was necessary to send another to their relief. Such accidents," he said, "are comparatively rare now." Undoubtedly there has been a very great improvement in the details or, as it has been called, in the elementary construction. This improvement has been largely due to the teaching of experience. A master mechanic will observe that a certain part of a locomotive fails more frequently than another, from which he draws the conclusion that the part which breaks is not strong enough, and in rebuilding the machine he increases the strength of the weak part. Now this process has been going on for thirty or forty years, until gradually all the weak parts have been strengthened. The older master mechanics remember, doubtless, the trouble which was caused years ago by the breaking of locomotive frames immediately over the axle boxes. This continued until the obvious remedy was applied of increasing the strength of the frames at that point. The same thing is true of many other details. Twenty years ago spring-hangers were perpetually breaking, and most of us can recall some dismal experience of hours of delay while a more or less ingenious locomotive runner improvised some temporary expedient to run his engine into port without a spring or spring-hanger. Such defects have, however, gradually suggested their own cure. There are, though, others the remedies for which are, unfortunately, not made so obvious, or which, rather, are not so harmless. The old camel engines built by Winans years ago achieved an unenviable distinction by exploding oftener than well-behaved engines should. After a number of lives were lost, an examination was made on the Baltimore & Ohio Railroad, and it was found that the opening at the base of the dome, which was very large, was braced by a number of flat bars of iron, which were attached to the top of an angle bar riveted to the side of the dome, as shown in the engraving. It was found



that the bolts which held these bars were always torn out of the holes after an explosion, which at once revealed the fact that such an attachment was very weak, and the fastening of the braces was then made with a forked end attached to a bar of T instead of L iron. The weakness of the boilers due to the defective connection of these braces was the result simply of oversight or the want of reflection. Any mechanic with the least pretension to a knowledge of elementary construction must have seen that boiler braces fastened in this way were quite insecure, and yet because those who manufactured them were not accustomed to observe the strength of attachments of this kind, those braces were used year after year and resulted in the loss of a number of lives, the destruction of much property and inconceivable suffering. Now if it were only in exceptional cases like this that a lack of knowledge of the principles of construction is shown, it would hardly be necessary to comment on it, but any one who will take the care to examine carefully mechanical structures will soon observe that in such details as these mistakes and defects are only too common.

We have referred a great many times in these pages to the criminal weakness of check chains, as they are usually applied to passenger cars. The object of such chains, as our readers know, is to keep the trucks of cars in line with the track in case the wheels get off the rails. If the trucks are held in line they will run a long distance over the cross ties with comparative safety, but if the trucks turn round, then destruction to the cars must soon follow if they are running at any considerable speed. The check chains must therefore resist a sudden shock in case the wheels leave the rails. Now if it was a frequent occurrence for cars to get off the track the process of the survival of the fittest would very soon lead to the disuse of the miserably insufficient chains which are often found. A check chain, however, only comes into use in case of an emergency. It may be but once in ten years, and possibly never; but when its services are in demand it is because human lives are in peril. Now let any master mechanic or car-builder ask himself the question, what strain such chains must probably bear, in case a car gets off the rails, and then let him calculate how much the chains and their attachments would bear if subjected to a test. The hooks which are usually employed not only on check chains, but elsewhere, as in foundry and wrecking cranes, often show the most lamentable ignorance of the first principles of their construction. If mechanics could only have opportunities of seeing experiments made to determine the strength of such parts, they would inevitably see their weakness.

A report was recently made, in some engineering publication, of investigations made in Germany of the strength of the drawing attachments of German cars. The experimenetrs first investigated the strength of the parts theoretically, and calculated how much strain they would resist, and then subjected them to a destructive test, to see which parts gave out first. If vague rumor of the cost of the maintenance of the drawing attachments of our cars is correct, such investigations here would very amply repay the cost of making them.

What is observable in much railroad machinery is that wherever the principle of the survival of the fittest applies, the elementary construction is at once improved; but whenever it is not subjected to constant practical test, it is apt to be carelessly designed and to be deficient in strength.

It is very difficult for a person accustomed to rely upon calculations of the strength of structures to realize how little confidence uneducated persons have in the results of such theoretical investigations. If locomotives come into the shop with spring-hangers constantly broken, they will believe that they are not strong enough, but if a person with pencil and paper should calculate how much less strength a crow-foot attachment of a boiler brace has than the brace itself, it produces very little effect upon them.

Notwithstanding all the experiments which have been made on the strength of riveted seams, they are seldom proportioned excepting by the rule of thumb, and hardly any right-feeling person can examine the attachments of boiler braces without an emotion of sorrow, that human life is held so cheap and knowledge is considered so dear.

It seems probable that the general use of testing machines in railroad shops will do very much to disseminate knowledge on this important subject. Of late years there has been an immense collection of data relating to elementary construction. The strength of riveted joints has been investigated by many different persons, but thus far the results have been so diverse that the subject has not been formulated into any clear laws. The strength of eye-bars, screw-bolts, beams, columns and girders has been tested by independent parties, and we have tolerably correct data in relation to them, but there are many subjects about which our knowledge is still entirely empirical and remains to be put into some exact form. The strength of different kinds of joints and attachments of wood and iron systems of framing, when the strains are not calculable, the proportions of journals and journal-boxes, springs and the laws of their deflection, are all subjects which at present are to a very great extent matters of tradition in the different trades. With the advent of the young generation of educated engineers from the technical schools, we may expect to see all these subjects investigated scientifically, so that to be ignorant of the principles of elementary construction will be regarded as evidence of unfitness for holding a responsible position.

The Southwestern Railway Association.

The Southwestern Rate Association is virtually restored, and apparently with great ease. This has been a remarkable case. No one complained of anything; the old combination was dissolved at the instance of the St. Louis roads, in the

manner provided by the agreement; then a contest for business was begun, which raged fiercely for about two months; but the first time the parties to the contest got together they came to terms in short order. All that was wanting, apparently, was a chance to get the different managers face to face. No one knows how long the contest would have continued if it had been necessary to wait for one of the combatants to call for a parley. They were saved this trouble by Mr. Fink's timely appeal to them, as the representative of a third party which might suffer some incidental damage by the struggles of the combatants. The new combination, which is to be called the Southwestern Railway Association (the name of the old one was the Southwestern Railway Rate Association), is on a basis somewhat different from that of the old one, and it divides the traffic somewhat differently. The St. Louis roads are to have 45 per cent. of the shipments from Missouri River points (Kansas City to St. Joseph and points between), 45 per cent. is to go to Chicago, and 10 per cent. directly to Toledo, by way of Hannibal and the Wabash Railway. Heretofore the Wabash has not been admitted into this combination. It could share in the business, but only by taking it at St. Louis. It has complained bitterly of this, and, as occasion offered, has taken Missouri River business at rates which, if unlikely to bring it any profit, have at least tended to spoil the business for the other roads. But in return for this share of the business (which is in addition to whatever it gets out of St. Louis), the Toledo rate on grain and provisions is made 5 cents higher than the Chicago and 10 cents, higher than the St. Louis rate, which is a difference which the Chicago roads have long claimed.

The traffic is to be divided, and not the gross earnings, as by the old combination, which left a company without any pay for any excess of traffic that it might carry, on the supposition that each road would so adjust its rates as to reject traffic when it had more than its share, and so drive it to those roads which had less than their share; for the latter had no motive for attracting business, since they received just as much for not carrying as for carrying. Under the new agreement we believe that it is intended to secure the distribution of the traffic by differences in rates, but not to leave it to the separate roads to make them. This should be done by the central office and authority, on the basis of the reports of shipments, which will enable it to so adjust rates as to secure to each its proper proportion.

At the present time, when navigation is open, and lake and canal rates very low, it is natural to suppose that the grain of Kansas would naturally tend to Chicago rather than St. Louis. In the winter, when Lake navigation was closed and considerable grain shipments were made down the Mississippi, the contrary is said to have been the case. If this is a permanent and natural condition of affairs, it would seem reasonable to recognize it in an apportionment of the traffic, by giving one place more at one season that at another. At present, the difference in rate in favor of St. Louis is not equal to much more than half of the difference between the rail rate from St. Louis and the water rate from Chicago to the East. That is, it would seem to be decidedly cheapest to ship to Chicago. As the traffic is to be divided in definite proportions, we presume the tariffs are tentative, and that the differences will be made greater or less until the traffic divides itself equally. The rates establtablished last Monday show the following differences:

From	Class. 1	2	3	4	Special.	Lumber.
Chicago	85	70	45	30	25	23
St. Louis	65	50	35	25	20	15

The differences here are from 16⅜ to 35 per cent. There are similar differences on the car-load freights, the rates being $75, $60 and $40 from Chicago, and $50, $40 and $30 from St. Louis, respectively, for classes A, B and C.

The most important freight in this direction is lumber, which has been carried recently as low as $20 per car-load.

The rates from Missouri River points eastward are as follows by the new tariff, in cents per 100 lbs.:

To	Class 1.	2.	3.	4.	Grain except wheat.	Live stock per car.
Chicago	75	60	45	25	20	$67.50
St. Louis	60	45	30	20	15	50.00
Toledo	..	..	..	30	25	.....

The important traffic is the grain, provisions and live stock. Provisions and wheat are included in the fourth class.

The restoration of rates comes after the roads have carried an enormous traffic at unprofitable rates. Kansas was full of grain, and the exceptionally large immigration has caused an unusual demand for lumber. The people have taken advantage of the rates to hurry forward the grain, and the lumber merchants, knowing that such rates could not continue, have stocked their yards as fully as their capital would permit, providing for a future as well as the current demand. It is thus much more than the average traffic for the period of the war that the companies have lost. The circumstances were favorable for exceptionally large earnings from the traffic which they were contending about; they have doubtless been made exceptionally small. The conflict, however, has been shorter than most expected it to be, and if the agreement which has succeeded it is maintained, and future troubles are avoided, the companies may be congratulated on having got off so easily.

New York & New England and Boston & Providence Consolidation.

The bill prepared to be submitted to the Massachusetts Legislature to authorize the consolidation of these companies, provides also that the Hartford, Providence & Fishkill shall be included in the consolidated line. The new company shall be called the Boston, Providence & New York, and shall issue $11,600,000 stock and $9,000,000 new 6 per cent. bonds. Of these the Boston & Providence shall be represented by $1,600,000 stock and $5,000,000 bonds to be secured by a special mortgage on its present property. The Hartford, Providence & Fishkill is to be represented by $2,000,000 bonds secured specially on that line. The New York & New England is to have $2,000,000 bonds, secured by a general mortgage, to replace its present debt, and $10,000,000 stock to be divided *pro rata*. The consolidated company would have 324 miles of road, making the stock $35,802 and the bonds $23,333 per mile, with a yearly interest charge of $540,000, or $1,667 per mile. The Railroad Commissioners favor the bill, urging that a consolidation will form a strong company with ample terminal facilities in Boston without additional outlay; that the expenses of management will be much reduced and some annoying competition will be stopped.

The New York & New England has had a very checkered career. Parts of the road have been in the hands of half a dozen different companies, while its existence and bankruptcy as the Boston, Hartford & Erie is still quite recent. It has a considerable business, but lacks proper facilities in Boston, and can hardly be called a prosperous company. The Boston & Providence has always been considered a strong company. Connecting the two largest cities in New England, it has a very large business. For many years it has paid regular dividends; and, although last year it dropped to 6 per cent., a general revival of business would easily enable it to return to 8 or 10. Its debt is comparatively small. Its road is a good one, and it owns in Boston large freight yards and the finest passenger depot in the city.

Both companies, it is said, are willing to agree to the consolidation, and will offer no opposition to the passage of the bill. Latest advices state that the Legislature has refused to consider the bill, and it will probably go over to next year.

Record of New Railroad Construction.

This number of the *Railroad Gazette* contains information of the laying of track on new railroads as follows:

Danville, Olney & Ohio River.—The first track is laid from Kansas, Ill., south by west to Westfield, 10 miles. It is of 3-ft. gauge.

This is a total of 10 miles of new railroad, making 307 miles completed in the United States in 1878, against 341 miles reported for the corresponding period in 1877.

THE WINTER GRAIN MOVEMENT closed entirely with the week ending April 27, so far as receipts at Atlantic ports are concerned, as it did four weeks earlier with regard to Northwestern shipments. Navigation on the lakes was begun April 1, since which time most of the shipments from the Northwestern markets have been by lake. Shipments from Buffalo by the Erie Canal were first made April 15, but these shipments did not begin to arrive in New York before April 27, the arrivals by boat before that time being chiefly or exclusively from points east of Baffalo. The whole season, from Dec. 1 to April 27, was 21 weeks, during which nearly all the receipts at Atlantic ports except New Orleans were by rail.

During these 21 weeks the receipts of grain at the eight Northwestern markets of St. Louis, Peoria, Chicago, Milwaukee, Duluth, Detroit, Toledo and Cleveland were, for five years, in bushels:

1877-78.	1876-77.	1875-76.	1874-75.	1873-74.
61,097,098	43,358,882	48,024,441	35,930,337	54,235,578

The receipts this year were 41 per cent. greater than last year, and 14½ per cent. greater than ever before.

The shipments of the same eight markets for the same 21 weeks were:

1877-78.	1876-77.	1875-76.	1874-75.	1873-74.
44,475,096	26,163,206	29,546,109	18,444,981	29,409,348

The shipments this year are 70 per cent. greater than last year and 50 per cent. greater than ever before. These shipments, however, have been swelled somewhat this year because of the early opening of navigation. The lake shipments this year have amounted to some 9,000,000 bushels, and in no other year of the five have they been more than half as much.

The receipts of the seven Atlantic ports—Montreal, Portland, Boston, New York, Philadelphia, Baltimore and New Orleans—for the same 21 weeks have been:

1877-78.	1876-77.	1875-76.	1874-75.	1873-74.
72,615,901	40,903,919	39,269,065	23,686,804	41,027,047

This shows this last season's receipts to have been 77 per cent. greater than last year or ever before. These latter have not as yet been affected to any noteworthy extent by the opening of navigation, but have been, except at New Orleans, almost wholly by rail. It is noticeable that they are greater than the total receipts of the same points for the first *seven* months of 1877.

The movement as a whole is unexampled, and shows very clearly the enormous increase in the rail movement of grain while navigation is closed. The average receipts at the Atlantic ports for these 21 weeks have been 3,440,000 bushels per week, which is nearly equal to the average receipts of the whole of last or any previous year. Ordinarily winter receipts have not been more than *half* the average weekly receipts of the year.

EAST-BOUND RATES have been broken, and there has been some controversy as to "who begun it," without any result, we believe; but the rates seem to have been reduced very generally from 25 cents to 20 cents per 100 lbs. on grain and provisions from Chicago to New York, with the usual differences for other places, and they appear to remain quite steady. Whether the cutting was begun because some thought that others were getting more than their share of the traffic, or because the railroads were not satisfied to leave the grain traffic substantially all to the lake vessels, does not appear. But it is a fact that the railroads have got very little grain out of Chicago and Milwaukee since navigation opened. The reports from Chicago show total shipments for the week amounting to 2,738,841 bushels, of which 2,520,156 bushels went by lake. The railroads, however, continue to get most of the flour (that week 50,874 barrels out of 59,483) and provisions, and it was not to be expected that the railroads would get much grain when lake and canal rates are as low as 10 cents or less per bushel from Chicago to New York. They will not, we venture to say, with a 20-cent rail rate. The vessels are bound to have the grain business if they can get enough to pay their crews. Unlike the railroads, they have nothing else to live on. They can reduce rates as well as the railroads, and experience has shown that they will rather than lose the grain. For some weeks last year 1½ cents per bushel was the prevailing rate on corn from Chicago to Buffalo, and at the same time the canal boats were carrying for 4¼ cents from Buffalo to New York. These were unprofitable rates, and the vessel-owners complained bitterly of them; but they accepted them rather than abandon the traffic, and they probably would do so again if they could not otherwise keep the grain from the railroads. Now a 20-cent rate, making 11.2 cents per bushel for corn, will have little effect in securing traffic for the railroads in the face of a rate of 6 cents a bushel by lake and canal. If the railroads decide to carry grain for less than cost this summer they will probably get some share of the traffic, and perhaps destroy all the profits of the lake and canal vessels, but we venture to say that they will, after all, get but a small part of the business. It is not improbable, we suppose, that 20 cents will remain the grain rate for the season; but it ought not to be the fourth-class rate or the provision rate. So far, the reduction in rail rates seems to have had no effect on lake rates, which is pretty good evidence that it has not yet diverted business from the vessels.

As we go to press we learn that the lake rate for corn has fallen from 3 to 2½ cents per bushel, and rail rates are further reduced.

THE CHICAGO & NORTHWESTERN ELECTION, which will be held a month from now, is to be contested. The two parties are both represented in the present directory, one being that which came in some two years ago, consisting chiefly of members of the Union Pacific directory, among whom were Jay Gould and Sidney Dillon. The other is the old management. That there is any question of policy that divides these parties does not appear. Proxies were anxiously canvassed for, and both sides exercise a strong influence and command directly a great many shares. The Dutch interest (and a very large portion of both stock and bonds is, or at least used to be, held in Holland) is reported to have ranged itself on the side of the old management. The transfer books are now closed, but it still seems to be doubtful which party will have a majority.

THE CINCINNATI SOUTHERN RAILWAY seems doomed to lie idle virtually, for want of the little money needed to complete it to Chattanooga. After considerable effort the Ohio Legislature was prevailed upon to permit the city of Cincinnati to vote upon the question of appropriating $2,000,000 to complete the line to Chattanooga. The question was submitted to a popular vote last Monday and was defeated. Cincinnati has already invested $16,000,000 in this project, on which it has to pay a million dollars of interest yearly. Now for the lack of the means to complete the road it can get nothing, or all but nothing, in return for this heavy tax. It is extremely doubtful whether the results of the operation of the road would justify the investment in it; but that is not the question now. The $16,000,000 have been spent, and the important thing for the city now is to get some return for it, whether it be an adequate return or not. So far municipal ownership does not seem to work very well.

A DECLINE IN TRAFFIC is noted on many roads. Part of it is easily accounted for by the opening of navigation, but part of it is of a kind not likely to be effected by that event. The roads which were carrying three or four millions of bushels of grain weekly to the seaboard have to content themselves now with a quarter of that amount.

Provision shipments are lighter, and altogether there are cars to spare. It may be suggested that if the railroads had not carried so cheaply last winter as to induce farmers and packers to hurry forward their produce at an unprecedented rate there might have been more to carry now. And it may be retorted that if there was more to carry now the railroads could get very little of it unless they took it at rates as low as or lower than those of last winter; and there is certainly something in that. But certainly the railroads should not expect to carry the traffic in the winter and then have it to carry in the summer too.

THE NEW YORK PIPE-LINE BILL has become a law. The Governor expressed his conviction that it is unconstitutional, but thought it would be best to have the courts pass upon it, and so permitted it to become a law without his signature by permitting the ten days to pass during which he had a right to veto it. The Attorney-General when called upon for an opinion said that he could not see why the interests affected and the character of the use were not as public as in other instances where the power of eminent domain has been conferred. It is possible that important consequences may result from the passage of this bill.

THE ATLANTIC & GREAT WESTERN is said to have been examined recently by representatives of Mr. Vanderbilt, with a view to estimating its value as a connection of the New York Central, and securing control of it if it should be worth what it will cost. It has been known that the new Rochester & State Line Railroad, which is a virtual exten-

sion of the Atlantic & Great Western from Salamanca to Rochester, received some assistance from the New York Central people, and it was natural to suppose that they had secured at least a chance for a share of the Atlantic & Great Western road. Apparatus for transferring freight cars from 6 ft. to standard-gauge trucks has already been put in at Salamanca, we believe; and the New York Central will soon be in position to do the business about as well as the Erie. If the New York Central should get control of the Atlantic & Great Western and the Michigan Central this year, the "New York, Lake Erie & Western" would be almost isolated. At present the most valuable traffic coming from the Atlantic & Great Western is the petroleum.

ONE DAY'S GRAIN RECEIPTS AT NEW YORK this week amounted to nearly a million and a half of bushels, which is more than the total receipts for the *two weeks* from April 14 to 27. We have said elsewhere in commenting on the light receipts at New York for these two weeks that their meagreness was probably due to the cessation of large rail receipts before there was time for shipments by canal to arrive, and that the deficiency would probably be made good with interest as soon as the boats from Buffalo began to arrive freely, and already our prognostications are fulfilled. Five-sixths of this day's receipts were by canal, 158 boats arriving.

nvestigation of Discrimination by the Massachusetts Railroad Commission.

[Report on an Investigation of Alleged Discrimination by the Boston & Albany Railroad Company in Coal Rates between Hudson and Pittsfield.]

This hearing was held under the general inquisitorial power conferred on this Board by Section 7 of the General Railroad Act of 1874, and in consequence of the following correspondence:

"L. POMEROY'S SONS.
"PITTSFIELD, Mass., March 11, 1878.

"*To the Honorable Board of Railroad Commissioners of Massachusetts:*

"GENTLEMEN—A discrimination was made last year equal to the *river freight*, say 50 cents per ton, in favor of Delaware & Hudson Canal Co. and Pennsylvania Coal Co., against all other coal companies, in transportation of coal to Pittsfield, while at the same time *all* were obliged to order through one Lucius Moore, or *no order would be filled*. We ask an investigation immediately, to know why this is allowed, as we are cut off in our supply, except at this additional cost, to the use of these two companies' coals.

"If Mr. Bliss is not directly interested, it is a persecution to which we should not be subjected. If he is interested, then he uses his position against right if not law.

"We have a letter from the agent of Pennsylvania Coal Co. which asserts the necessity of joining this combination against their will or withdrawing entirely from marketing their coal at Hudson."

"BOARD of RAILROAD COMMISSIONERS,
No. 7 PEMBERTON SQUARE, BOSTON, March 12, 1878.

"*Messrs. L. Pomeroy's Sons:*

"GENTLEMEN—The enclosed letter, apparently from you, is without any signature, which was probably omitted by accident. If you, or the writer, will return it with signature, the Board will inquire into the matter to which it refers.

"Yours respectfully,
"WM. A. CRAFTS, Clk., etc."

"L. POMEROY'S SONS,
"PITTSFIELD, 14th March, 1878.

"*To the Hon. Board of Railroad Commissioners:*

"GENTLEMEN.—Ours of 11th was simply a draft which we intended to submit to some of our large coal dealers and users for approval, and was sent off by copying clerk. As it has gone through your office, though crude, yet we think it as well as as a more formal paper. We have seen several parties and read what had gone to you, and all agree with its contents as being statement of facts as far as we believe or can draw conclusions. With this we send a letter from Pres't of Penn. Coal Co. which explains itself. Our coal dealers feel aggrieved and yet dare not say much for fear of a visitation. What we ask is free trade in coal at Hudson, with no discrimination in favor of a special agent.

"Yours truly, L. POMEROY'S SONS."
(Inclosure referred to.)

"OFFICE OF THE PENNSYLVANIA COAL CO.,
"No. 111 BROADWAY, NEW YORK, March 8, 1878.

"*Messrs. L. Pomeroy's Sons, Pittsfield, Mass.:*

"DEAR SIRS: I have your favor of the 7th inst., and notice what you say in regard to our Pittston coal going over the Boston & Albany road and in connection with Mr. Hall, and have to reply that there is a real difficulty in the case which will be difficult for you to understand without knowing all the circumstances in the case. As it now stands we are *compelled* to join with the Delaware & Hudson Co. to get the advantage that Bliss offers, *or* on the other hand we must be left out of the market entirely. I do not at the present time know just what we shall do.

"Yours truly, GEO. A. HOYT, Pres."

"BOARD OF RAILROAD COMMISSIONERS,
"BOSTON, April 5, 1878.

"*Messrs. L. Pomeroy's Sons:*

"GENTLEMEN.—The consideration of your communication of 14th March, and its inclosures relating to alleged discriminations in prices charged on coal delivered in Pittsfield, has been delayed owing to a press of other business. I am now directed to say that the Commissioners see no way of proceeding in the matter except by public investigation and the examination of witnesses on the spot. No course of private inquiry would satisfy the parties or bring out the facts in the case if they are as suspected by you. If you and those interested desire to have a public hearing, the Board will give one at such time as may suit your convenience. Please advise me as to your wishes in the matter.

"Yours respectfully,
"WM. A. CRAFTS, Clk. R. R. Com."

"PITTSFIELD, Mass., April 6, 1878.

"*Board of Railroad Commissioners, No. 7 Pemberton Square, Boston.*

"GENTLEMEN.—As we up here on the mountains do not belong to the Hub, we cannot expect any consideration, as every hearing before your Honorable Board has decided that the Boston & Albany Railroad were right in all their proceedings, and while *all* of our people feel the injustice of being debarred from purchasing their coal where they choose, *without discrimination in freight*, yet they say, one and all, there is no use of endeavoring to right a wrong through the Railroad Commissioners.

"Yours very truly, "L. POMEROY'S SONS."

"BOARD OF RAILROAD COMMISSIONERS,
"BOSTON, April 8, 1878.

"*Messrs. L. Pomeroy's Sons, Pittsfield:*

GENTLEMEN.—I have to acknowledge the receipt of your favor of the 6th inst. In reply I am directed to say that the Board of Railroad Commissioners are aware of but one matter upon which they have ever been requested to act by the citizens of Pittsfield, and upon that a report was submitted in writing giving in detail the reasons for the conclusions which they arrived at. If those reasons were not satisfactory to yourselves or other citizens of Pittsfield, they were at least courteous, and no exception, so far as this Board is aware, was taken to them in the Legislature or elsewhere. The members of the Board are, therefore, as they direct me to say, wholly at a loss to understand why so extremely, to say the least, discourteous a communication as yours of the 6th instant should now have been addressed to them. For their action in this, or in any other matter which may come before them, they stand perfectly ready to answer to your complaint before either the Governor or the Legislature of the State. "Yours respectfully,

"WM. A. CRAFTS, Clk. RR. COM."

"OFFICE OF THE BOARD OF RAILROAD COMMISSIONERS,
"BOSTON, April 12, 1878.

"*Messrs. L. Pomeroy's Sons, Pittsfield:*

"Gentlemen: Referring to my communication of the 8th inst., I am directed to say that at a meeting of this Board held on the 10th inst., your letter of the 6th was considered. It was thereupon ordered that a public hearing on the cause of complaint to which your several letters relate, be held at Pittsfield on the 25th inst., at 9 o'clock, a. m. The examinations will be conducted under oath, and if you will send to this office a list of those persons whose evidence you consider material, subpœnas will be served upon them. An early reply will oblige the Board. "Yours respectfully,

"WM. A. CRAFTS, Clk. RR. Com."

In pursuance of this order a hearing was held at the time and place designated, at which the Boston & Albany road was represented by its President, General Manager and Counsel, and the complainants by T. Pomeroy and Counsel. Witnesses were summoned and examined under oath, and all persons desiring to make statements were heard.

The case was peculiar in that the investigation was forced upon the Board by a direct imputation, coming from responsible persons making a complaint, upon its impartiality and independence of action in any matter in which the interests of the Boston & Albany road were involved. That such an imputation was thoughtlessly and inconsiderately made, and without the slightest idea of subsequently sustaining it, does not alter the fact that it was made, and calls for some notice. Unlike various other boards of railroad commissioners which have, from time to time, during the last six years, been organized in different States of the Union, the Massachusetts Board was not created wholly or in chief as a mere prosecuting agency, intended to carry on, right or wrong, a war of endless litigation and annoyance with railroad corporations. It was, on the contrary, designed to exercise judicial functions and to exercise them judicially. Accordingly, in the very numerous cases which during the last nine years have come before them, the members of the Board have always borne it in mind that, having heard the evidence and investigated the facts, it was incumbent on them to decide the case according to the evidence and according to the facts, and not upon any preconceived theory that railroad corporations were always in the wrong. Where complaints appeared to have been made against these corporations on insufficient grounds, the Commissioners have felt it their duty to say so. Where requests for their intervention have been made which were not reasonable, they have refused to intervene. As these contingencies have naturally often arisen, it was of course to be expected that disappointed parties would often intimate that the Board was under the influence or had become the mere tool of these corporations. Such unpleasant imputations were to be accepted as a matter of course and passed over without notice as an annoyance inseparable from any just and impartial performance of duty. But whatever may heretofore have been said or thought elsewhere, the present is the first case in which any direct imputation on the motives of the Board has been made in a communication addressed to it. In view of this fact, the Commissioners were not disposed to allow the parties making the complaint not to proceed with it. They considered that a thorough and public investigation was due to themselves as well as to the Boston & Albany officials. As the result of that investigation it now appears that the matter of complaint in great degree arose out of the earlier investigations of the Board made two years ago under a resolve of the Legislature, a detailed report of which was made at the time. (Eighth Annual Report, pp. 63-77.) Stimulated by that report into making a special effort to cheapen coal to the manufacturers of Berkshire County, it seems that Mr. Bliss, the General Manager of the Boston & Albany road, carried into effect an arrangement which he had before that time been considering, under which a through rate was made with certain companies for the delivery of coal at Hudson.

By virtue of this arrangement between the Boston & Albany Company on the one side and the Pennsylvania Coal Company delivering at Newburg and the Delaware & Hudson Canal Company delivering at Rondout on the other side, the river rate from those points to Hudson was rebated. The coal thus reached the Boston & Albany road at Hudson at the same price at which it reached New York harbor, the great central point for all coal competition. This was equivalent to a reduction of 50 cents a ton from previous prices. As a part of the details deemed necessary to carry out this joint arrangement, the two coal companies united in having a single agent at Hudson through whom alone they sold their coal for shipment in this way. They then began operations.

The inducement to these companies to enter into this arrangement was obvious. They wished to compete with other coal companies who delivered their coal at New York harbor, for the markets on the line of the Boston & Albany road as far as Framingham. The Boston & Albany wished them to do this that it might carry the coal in competition with the railroads running north from points on Long Island Sound. The doing away with the river rate brought the price of the Newburg and Rondout coal to a point which made this competition possible. The arrangement having been effected, Mr. Bliss thought he had accomplished a very desirable result for the consumers of Berkshire County, and wrote to Mr. Pomeroy to that effect. That he had accomplished the result of materially cheapening coal was made apparent by the fact that all competitors on coal delivered at Hudson were driven out of the business by the combination. They were necessarily driven out of the business for the obvious reason that, as the rate for the coal of the combined companies at Hudson was the same as at New York, no competitors could afford to carry New York coals to Hudson and pay the river charges. Accordingly all competition at Hudson ceased, and the struggle for the markets along the line of the Boston & Albany road was simply between the Hudson River coal and the Long Island Sound coal. This struggle, however, was very severe and brought the rates down at once.

It became quite obvious in the course of the hearing, and indeed was not disputed, that this aspect of the case had wholly escaped the notice of the complainants. They had seen only the facts immediately before them—that New York harbor coal could not be delivered at Hudson, that all purchases had to be made through a single agent, that other agencies were driven out of the field. Seeing these facts they jumped at their own conclusions and did not hesitate to state them. There were, however, absolutely no grounds for them. In so far as their conclusions took the form of imputations on Mr. Bliss they were publicly withdrawn at the hearing. His exoneration was complete.

As regards the merits of the case, it was urged that the arrangement, no matter whether it resulted in a reduction of the price of coal or not, was a discrimination on the part of the Boston & Albany road against certain parties and in favor of others, and as such was opposed both to law and public policy. Not only was the rebate of the river freight limited to the coal of two producers, but it was further limited to that portion of the coal of those producers which was sold by a particular person. While the coal sold by this person was allowed the rebate when offered at Hudson, other coal of the same companies, from the same place and in equal quantities, was charged the full local rates.

The case thus presented can be dealt with in either of two ways—practically or theoretically. Considered practically there is no doubt whatever that the arrangement is one which does result in the strongest possible competition for supplying coal at the lowest rate in every local market on the Boston & Albany road from Hudson to Framingham. Much stress was laid on the fact that all shipments had to be made through one agent. Such a method of selling is, however, an absolutely essential feature to the arrangement. That agent represents two competing companies, and through him they effect their sales on some basis not in evidence for a division of the business. They compete in the Boston & Albany markets, not with each other—with each other through this agent they combine and divide—but they compete with other companies who deliver in New York harbor and ship through Long Island Sound. If the Commissioners were to hold this to be a discrimination and put a stop to it, the result would simply be that the combination would break up, the river rate would be restored, the Hudson River coal would cease to compete in the local markets with the Long Island Sound coal, and the price of the article would rise at once. This is the practical view of the subject which the Commissioners in shaping their course cannot lose sight of. As a matter of theory, the case is much more difficult to deal with. Indeed, if the facts were exactly as stated by the complainants, a discrimination would be made out. The rebate, it is true, constitutes part of a through rate on the coal of the Pennsylvania Coal Company and the Delaware & Hudson Canal Company from Rondout or Newburg, but why, it is argued, should not other persons buying the coal at Rondout or Newburg be entitled to the same through rates from these points? It is not a case of one party coming in at Hudson against another starting at Newburg and claiming instead of the regular rate the proportionate part of a through rate. That case would present no difficulties. Here, however, both parties start from the same point and presumably with equal quantities. Why should they not receive the same terms from the common carrier at Hudson? Were the facts exactly as here stated, whatever the practical results of an interference might be, a case of discrimination would be made out. As is perfectly well known, however, the single agent referred to, whose coal is favored by the rebate as against all others, is in point of fact nothing more than the general ticket or freight agent of the combined coal companies. They simply and for their own convenience in doing their business have all orders for coal come through him. With this the common carrier from Hudson has nothing to do. He has simply made a contract with the producers and carriers for the through carriage of coal. In carrying out that contract he knows them only. The rate, therefore, is not in point of fact a Newburg or Rondout through rate, but a miners' and carriers' through rate—the miner and carrier designating their own agents for carrying it out. As such it seems fairly within the well understood principles regulating through rates as compared with local.

Apart from this distinction, however, it is as well to face the simple and perfectly well understood fact that the whole coal business is now matter of combination. These combinations may be ignored, but they none the less exist and make themselves felt. The whole difficulty in the present case arises from an attempt to thus ignore them in pursuit of a theory in itself just and right. Every pound of coal which reaches Hudson, unless sent there at a sacrifice and with an ulterior end in view, is produced by the Pennsylvania Coal Company or by the Delaware & Hudson Canal Company. These companies have combined at Hudson to compete with other companies combined at New York for the control of certain local markets. That combination between them is essential to the subsequent competition, but it depends on a division of business which is effected and controlled by their doing it exclusively through one joint agent. Now if other and outside parties can come in and buy coal from one company or the other at Newburgh and Rondout, and then take that coal to Hudson and there ship it on the same terms as the coal sold through their joint agent, it follows, as a matter of course, that the companies are competing with each other at once, and the combination is at an end.

Even if the facts were, therefore, exactly as presented by the complainants, the Board could not take the responsibility of recommending or insisting on a course which could only result in putting a stop to a most effective competition, and consequently raising the price of coal all through the interior of the State. If they did so they would simply do what they could to break up one combination in order to place the local interior markets wholly in the power of another. And this on the theory that combinations are bad things, and should be ignored, even where they are known to exist, and where, as in this case, they result in securing to a large section the sharpest competition which the largest market of the country affords. The fact that the essential principle of the arrangement now under consideration is that the price of coal at Hudson should always be the same as that in New York harbor, from any practical point of view, ought to be conclusive. Competition can be carried no farther. Its ultimate point is reached.

The suggestion was also made that the local rate on coal from Hudson to Pittsfield was too high. It is now $1.25, and those present at the hearing thought it ought to be reduced to 80 cents. This subject was, however, very fully discussed by the Commissioners in their report of a year ago, already referred to. The circumstances have not since changed, and they are unable to see any grounds for revising the conclusions they then arrived at. On the contrary, the course of events has only confirmed them. The present is no time, except in special cases, for this Board to urge on the railroad corporations of this state further reductions of their freight tariffs. Take the case in point, for instance—that of the Boston & Albany road. Last

year it moved 313,000,000 tons of freight one mile, the largest year's work it ever did; for doing this it received 1.21 cents per ton per mile, and out of a total gross receipt of over $2,680,000 the company netted a trifle over $380,000, or a profit on the business of 14 per cent. as compared with one of 20 per cent. during the previous year. This margin would seem to be narrow enough, and unless this Board is prepared always, on every request and without any regard to facts or evidence, to recommend reduction of rates, they must decline to do so in this case.

But it is argued in reply that the railroad company is charging unreasonable local rates in order to recover the losses it incurs by persisting in doing its through business at a loss. This, it is insisted, is unjust, and constitutes a good cause of complaint. In the first place, however, as the Commissioners thought they very clearly showed in their report already referred to, the rates now charged by the Boston & Albany road for the carriage of coal to Pittsfield are, considering the nature and amount of the traffic, neither unusual nor unreasonable; and in the second place it must be remembered that neither the Boston & Albany nor any other railroad engaged in the through freighting business has any control over the rates at which it does that business. It can only influence them by taking the extreme course of going out of the through business altogether and charging local rates on everything which goes over its line. For the Boston & Albany road to undertake to do this, is, as the complainants very well know, simply out of the question. The very suggestion of such a policy on its part would lead to a popular excitement and clamor in the State which would put a stop to it at once. The fact is, as the business firms of Pittsfield must perfectly well understand, as long as the present system of railroad competition continues, rates must and will vary. The business community which enjoys the advantage of low through rates will have to accept the burden of relatively, if not absolutely, high local rates. If the companies are compelled to reduce everything *pari passu*, they would have to go out of the freighting business. The only question in each case for this Board to consider is whether the particular local rate complained of is unreasonable. The Pittsfield coal rate has certainly received its full share of discussion from this point of view (Eighth Annual Report, 1877, pp. 63–77). The arguments two years ago at Pittsfield were, however, again advanced at the present hearing, and rates in use on the great coal roads were quoted with seeming confidence as being perfectly applicable to roads doing a local coal traffic. Under these circumstances it is quite apparent that what the commissioners have heretofore written on the subject has either not been read by the complainants or has failed to convince them; there would consequently seem to be no ground for hoping that anything now written would either be more carefully read or prove more satisfactory.

In view of the facts that have been stated, and the retraction made at the hearing as respects all the imputations cast upon Mr. Bliss, the Commissioners do not hesitate to say that the complaint in this case was groundless, that the officials of the Boston & Albany road appear to have done all that was reasonably in their power for the benefit of the coal consumers of Pittsfield, and that they have been eminently successful in their efforts. Finally, the members of the Board see no possible ground on which, possessing any knowledge of the facts in the case or the principles of transportation involved in them, or paying any regard to the evidence presented before them, they could now or heretofore have arrived at conclusions on the subject under discussion different from those which they now present, or which they formerly presented in the report out of which the present subject of complaint arose.

BY THE BOARD OF RAILROAD COMMISSIONERS.
BOSTON, May 2, 1878. WM. A. CRAFTS, Clerk.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Meetings.

Meetings will be held as follows:

Keokuk & Des Moines, annual meeting, at the office in Keokuk, Ia., June 6, at noon.

Flint & Pere Marquette, annual meeting, at the office in East Saginaw, Mich., June 5.

Ashtabula, Youngstown & Pittsburgh, meeting of bondholders at the Continental Hotel in Philadelphia, May 16, at 11 a. m., to consider a plan of reorganization.

Illinois Central, annual meeting, at the office in Chicago, May 29, at noon.

Dividends.

Dividends will be paid as follows:

Cleveland & Pittsburgh (leased to Pennsylvania Company), the regular quarterly dividend of 1¾ per cent. on the guaranteed stock, payable June 1.

Boston, Concord & Montreal, 3 per cent., semi-annual, on the preferred stock, payable May 13.

Railroad Conventions.

The eleventh annual convention of the *Master Mechanics' Association* will be held in Richmond, Va., beginning Tuesday, May 14.

The fifth annual meeting of the *Purchasing Agents' Association* will be held in New York, beginning Tuesday, May 21.

The twelfth annual meeting of the *Master Car-Builders' Association*, will be held at Niagara Falls, N. Y., beginning Wednesday, June 12.

The Yardmasters' Mutual Benevolent Association will hold its annual convention in Chicago, June 5.

Foreclosure Sales.

The *Whitewater Valley* road was sold at Connersville, Ind., May 2, under foreclosure of mortgage. Bought for $25,000 by H. Parkman for account of the bondholders, who are chiefly Boston men. By the latest accessible report the bonded debt was $1,021,840. The road extends from Hagerstown, Ind., south by east to Harrison, 63 miles, and its trains run over the Harrison Branch from that place to Valley Junction, O., on the Indianapolis, Cincinnati & Lafayette, seven miles. It said that the road will be worked in connection with the Fort Wayne, Muncie & Cincinnati, and under the same management. The bonds of both roads are held largely by the same parties.

The *Pensacola & Louisville* road was sold at Pensacola, Fla., May 6, under foreclosure of a mortgage for $600,000. Bought by J. F. Sullivan, President, for account of the Pensacola Railroad Company, to which the interest of the old company was transferred some time ago. The sale now completes the transfer and fixes the ownership in the Pensacola Company. The price paid was $50,000 for the road and from 10 to 25 cents per acre for the lands, which were sold in separate parcels. The road is 44 miles long, from Pensacola, Fla., north to the Mobile & Montgomery near Pollard, Ala.

Future sales are noted as follows:

The *Michigan Lake Shore* road will be sold June 19, under decrees of foreclosure granted at suit of Albert Keep and Chester Warner, trustees. The road, which has been in the hands of a receiver for several years, extends from Allegan, Mich., to Muskegon, 57½ miles. By the last report the funded debt was $880,000, and there were about $113,000 Receiver's certificates. The road has been controlled but not worked by the Pennsylvania Company.

Railroad Purchasing Agents' Association.

The following circular from Mr. A. G. Thompson, Secretary and Treasurer of this Association, is dated May 1:

"The fifth annual convention of our Association will be held at the St. Nicholas Hotel, New York city, commencing Tuesday, May 21, at 9 a. m.

"The subjects for discussion thereat have been published in the March and April numbers of the *Railway Purchasing Agent*, and a copy of the proceedings of last year's meeting was sent you, from which you were able to get an idea of the character of these conferences and discussions; and it is earnestly hoped that you are prepared to meet us this year.

"While our former meetings have been of great benefit to ourselves and the important interests we represent, this next meeting will be of much greater benefit if you will do your share.

"The presence of each and every purchasing agent is necessary to insure full and complete success, and to bring the greatest good to our Association; and it is as much a part of the duty you owe to the interests of your railway, to be present and take part in these meetings, as in any service you perform.

"The purchasing agents of the country are as intelligent and well-informed in their department as any class of department officers; and the information gained in their practical experiences, compared and discussed in general council, is of the most incalculable benefit to each. You cannot fully realize the importance and truth of these facts until you have attended at least one of these meetings; therefore, we cordially and earnestly invite you to meet us in New York, and show by your presence that you feel an interest in this matter. The benefits you will there gain, can only be estimated afterward.

"A largely increased attendance is assured, but to secure the highest attainable advantages, we should have the aid of all.

"Please notify the undersigned as early as practicable, whether you will be with us."

ELECTIONS AND APPOINTMENTS.

Atchison Topeka & Santa Fe.—Mr. John P. Whitehead has been appointed Auditor, in place of A. N. Young, resigned. Office at Topeka, Kan. Mr. Whitehead has been Auditor for the Colorado road, and, for a long time, occupied that position on the Rockford, Rock Island & St Louis.

Atlantic & Pacific Telegraph.—At the annual meeting in New York, May 8, the following directors were chosen: Edwin D. Morgan, Augustus Schell, Hamilton McK. Twombly, Norvin Green, James H. Banker, Chauncey M. Depew, R. H. Rochester, Harrison Durkee, Thomas T. Eckert, William J. Syms, John H. Mortimer, George G. Sampson, Sidney Dillon, Elisha Atkins, Henry M. Taber. Gen. Eckert is to be retained as President.

Baltimore & Ohio.—At the regular monthly meeting, May 8, the board unanimously confirmed the appointment of Mr. Wm. M. Clements as Master of Transportation. He has held the position for several months.

Chicago, St. Paul & Minneapolis.—This company has been organized as successor to the West Wisconsin by the election of the following directors: J. C. Spooner, H. H. Weakly, E. H. Winter, C. D. W. Young, Hudson, Wis.; G. B. Smith, Madison, Wis.; Philetus Sawyer, Green Bay, Wis.; J. H. Howe, Kenosha, Wis.; W. H. Ferry, W. H. Ferry, Jr., Lake Forrest, Ill.; J. W. Ferry, J. B. Redfield, Chicago; R. Edgerton, R. P. Flower, New York. The board elected W. H. Ferry, President; H. H. Weakly, Secretary and Land Commissioner; R. P. Flower, Treasurer; J. B. Redfield, Assistant Treasurer; C. D. W. Young, Auditor; G. W. Winter, General Superintendent; J. C. Spooner, General Solicitor. The company is controlled by the Chicago & Northwestern.

Chicago Burlington & Quincy.—The New York *Tribune* of Wednesday stated that Mr. Robert Harris had resigned and that Mr. John M. Forbes, of Boston, one of the oldest directors, had succeeded him. We have not been able to inquire as to the accuracy of this report, which is somewhat surprising, as we go to press.

Covington, Columbus & Black Hills.—Mr. H. K. Lane, of Des Moines, Ia., has been appointed Receiver by the United States Circuit Court in a suit brought for foreclosure of mortgage.

Corsicana & Palestine.—The officers of this new company are: President, S. J. T. Johnson; Secretary, Bryan T. Barry. The office is at Corsicana, Texas.

Detroit & Bay City.—At the annual meeting in Detroit, May 8, the following directors were chosen: Moses Taylor, Samuel Sloan, Marshall O. Roberts, T. N. Zine, Arthur Bouden, Edwin F. Hatfield, Roswell G. Rolston, James F. Joy, Townsend North.

Detroit, Lansing & Northern.—At the annual meeting in Detroit, May 8, the following directors were chosen: Nathaniel Thayer, John A. Burnham, H. H. Hunnewell, George Shattuck, Charles L. Young, Charles Merriam, Charles F. Adams, Jr., Nathaniel Thayer, Jr., George W. Weld, Alpheus Hardy, James F. Joy.

Evansville, Washington & Worthington.—The officers of this new company are: President, R. G. Hervey; Secretary J. B. Hager; Treasurer, H. D. Scott. The same persons are also officers of the *Chicago, Worthington & Washington*, another new company.

Flushing, North Shore & Central.—At the annual meeting, May 6, the following directors were chosen: Henry Clement, Morris Franklin, Herman Funke, E. B. Hinsdale, Charles Knoblauch, John W. Lawrence, John D. Locke, Samuel B. Parsons, Adolph Poppenhusen, Frederick A. Potts, Isaac Sherwood, Edward E. Sprague, Carl Victor. The road is leased to the Long Island.

Greenville & Columbia.—At the annual meeting in Columbia, S. C., May 2, the following were chosen: President, Wm. J. Magrath; directors, L. D. Childs, H. T. Farmer, F. F Gary, Robert Adger, T. D. Wagner, R. L. McCaughrin, J. C. Roach, A. Simonds, Alexander Macbeth, Hamilton Beattie, J. B. E. Sloan, George W. Williams.

Harrison Branch.—At the annual meeting in Cincinnati, May 6, the following directors were chosen: Eli Kinney, Henry Peachy, E. V. Cherry, Wm. N. King, John C. Short, Charles W. Short. The board elected Charles W. Short, President; Horace W. Woodruff, Secretary.

Hannibal & St. Joseph.—Mr. J. B. Carson has been appointed General Manager, in place of R. S. Stevens, resigned. Mr. Carson was appointed Traffic Manager a short time since, and was previously General Manager of the Blue Line. It is said that there will be several other changes on the road.

Mr. W. H. McDoel, late General Western Agent, is appointed General Freight Agent.

Indiana North & South.—The following officers were recently chosen: President, Samuel Kimberly; Vice-President, C. Wade, Cleveland, O.; Secretary, L. M. Mikesell, Attica, Ind.; Treasurer, C. S. Anderson.

Kansas Pacific.—At the annual meeting in Lawrence, Kan., May 3, the following directors were chosen: John D. Perry, Robert E. Carr, D. M. Edgerton, T. F. Oakes, Theodore G. Meier, S. M. Edgell, Dwight Tredway, St. Louis; Sidney Dillon, Jay Gould, A. H. Holmes, New York; Frederick L. Ames, Boston. The new directors are Messrs. Tredway and Holmes.

Manchester & North Weare.—At the annual meeting in Manchester, N. H., May 6, the following were chosen: President, Phinehas Adams; directors, Charles E. Balch, Charles Chase, Jesse Gault, G. Foster, B. A. Kimball, C. W. Stanley; Clerk, C. H. Bartlett. The road is leased to the Concord Railroad Company.

Michigan Central.—Mr. C. A. Wheeler is appointed Division Superintendent of the West Division, Chicago to Michigan City, including the Joliet Branch, with office at Chicago, to take effect May 1.

Memphis, Paducah & Northern.—The officers of this company, successor to the Paducah & Memphis, are: President, H. W. Smithers, Louisville, Ky.; Vice-President, Extine Norton, New York; General Manager, N. Monsarrat, Paducah, Ky.

Pierce City & Northwestern Arkansas.—General Wilson is President and G. A. Myers, General Manager of this new company. Their offices are at Fayetteville, Ark.

Philadelphia, Newtown & New York.—At the annual meeting in Philadelphia, May 6, the following were chosen: President, H. G. Sickel; directors, Alfred Blaker, Silas Cary, Smith Harper, Joseph Johnson, J. H. Krouse, H. V. Sickel.

Queen Anne's & Kent.—At the annual meeting in Centreville, Md., May 1, the following directors were chosen: Jacob Tome, Joseph Bringhurst, T. Morris Perot, B. T. Biggs, Edward Larkins, William Crawford, Jacob Hinkley. The board elected B. T. Biggs, President; Robert Craven, Secretary and Treasurer.

St. Paul & Pacific.—Mr. W. S. Alexander has been appointed General Ticket and Passenger Agent of the First Division, in place of J. W. Doran, resigned. Office at St. Paul, Minn.

Scioto Valley.—Mr. Wallace McGrath has been appointed Roadmaster. He was Assistant Engineer on the Columbus & Toledo during its construction.

Shenandoah Valley.—At the annual meeting in Winchester, Va., May 1, Wm. Milnes, Jr., was reëlected President, and the following directors chosen: Col. Wm. H. Travers, A. R. Boteler, U. L. Boyce, H. B. Davenport, H. B. Harnsberger, J. Q. A. Nadenbousch, Logan Osborne, David Billmyer, W. D. Smith, John T. Lovell, Col. Mann Spitler.

Southern Minnesota—Mr. John M. Egan has been appointed Assistant Superintendent.

Syracuse, Chenango & New York.—At the annual meeting in Syracuse, N. Y., May 3, the following directors were elected: James J. Belden, Alfred A. Howlett, John Greenway, A. Cadwell Belden, Hiram Eaton, Myron Bangs, Wm. Brown Smith, Geo. F. Comstock, Horace Candee, R. Nelson Gere, Henry D. Denison, Dennis McCarthy, Henry L. Duguid.

Wabash.—Mr. George N. Clayton has been appointed General Northwestern Passenger Agent, with headquarters at Kansas City, Mo., vice W. R. Crumpton, resigned.

Western, of North Carolina.—At the adjourned annual meeting in Fayetteville, April 25, L. C. Jones was chosen President, with the following directors: A. P. Hurt, E. J. Lilly, A. A. McKethan, Dr. James A. McRae, John D. Williams, Fayetteville, N. C. The following were also announced as appointed State directors for the ensuing year: L. J. Haughton, Chatham, N. C.; John M. Worth, Randolph, N. C.; D. F. Caldwell, C. P. Mendenhall, Greensboro, N. C.

Wheeling, Pittsburgh & Baltimore.—At the annual meeting in Washington, Pa., May 6, the following directors were chosen: J. B. Washington, W. S. Bissell, W. W. Smith, Wm. Workman, S. B. Hayes, Wm. Keyser, A. Madison. The board reëlected J B. Washington President; W. W. Smith, Secretary; W. H. Ijams, Treasurer. The road is worked by the Baltimore & Ohio.

PERSONAL.

—Mr. James W. Doran has resigned his position as General Ticket and Passenger Agent of the St. Paul & Pacific, First Division, and will take charge of the Northwestern Stage & Transportation Company's business in the Black Hills. He will have his headquarters at Deadwood, Dakota.

—It is reported that Mr. J. T. Vose, of Boston, will succeed the late John E. Lyon as President of the Boston, Concord & Montreal Company. It is also said that Superintendent J. A. Dodge will be made General Manager, and Cashier C. M. Whittier, Superintendent. Mr. Lyon gave close personal attention to the road, and it is probable that a large part of the work done by him will be assigned to Mr. Dodge.

—Mr. Charles M. Clark, Local Ticket Agent of the Pittsburgh, Fort Wayne & Chicago at Chicago, who was reported a defaulter by a dispatch from that city, addresses the following letter to the *Inter-Ocean*: "An article appeared in a morning paper of this date severely reflecting upon me in regard to my connection with the Pennsylvania Company. For the most part the statements made are wholly untrue, some of them glaringly so. So far as any wrong action is concerned, I am willing to leave that to the proper authorities to decide. I am confident of final vindication, and hereby ask my friends and the public to suspend judgment in the case until I have had a hearing."

—Mr. R. S. Stevens has resigned his position as General Superintendent of the Hannibal & St. Joseph. Mr. Stevens has been with the road nearly three years, and was previously for a long time General Manager of the Missouri, Kansas & Texas.

—Mr. Ossian D. Ashley, a New York broker, a director of the Wabash, the Ohio & Mississippi and other companies, has filed a petition in bankruptcy. Mr. Ashley was prominent in the reorganization of the Wabash and in the Ohio & Mississippi election split last fall.

—Mr. Charles Morgan, one of the largest individual owners of steamship and railroad property in the country, died at his residence in New York, May 8, aged 83 years. He was born in Clinton, Conn., but came to New York when 14 years old, and, after some years' service as a clerk, went into

business as a ship chandler. From this he soon passed into the shipping business, and was already a large owner of sailing vessels plying from New York to Southern ports, when ocean steam navigation became established as practicable. Mr. Morgan at once took hold of the new motive power, and established the first regular steam line from New York to Charleston. This was soon followed by lines to New Orleans, Galveston and other Gulf ports, and his business became so extensive that he established the great Morgan Iron Works in New York, for the purpose of repairing and building his own vessels. Later Mr. Morgan became interested in railroad lines, chiefly as feeders to his steamships. He bought the New Orleans, Opelousas & Great Western (now Morgan's Louisiana & Texas), rebuilt and equipped it, making a new port at its terminus on Berwick Bay. He built the Gulf, Western Texas & Pacific from Indianola to Cuero, and within the past few years he has built a line 8 miles long to connect Houston with a new port he established at Clinton, and acquired control of the Houston & Texas Central road. He leaves a fortune estimated at $10,000,000, chiefly in railroad and steamship property. It is said that he has completed arrangements for transferring this property to a company, whose stock will be distributed among his heirs.

TRAFFIC AND EARNINGS.

Railroad Earnings.

Earnings for various periods are reported as follows:

	1877.	1876.	Inc. or Dec.		P. c.
Year ending Dec. 31:					
Camden & Atlantic..	$477,483	$564,851	D.	$87,368	15.5
Expenses.....	300,442	297,878	I.	2,564	0.9
Net earnings.....	$1 7,041	$266,973	D.	$89,932	33.7
Earnings per mile.	7,127	8,431	D.	1,304	15.5
P. c. of expenses..	62.92	52.74	I.	10.18	19.3
Greenville & Colum'a	$381,910	422,357	D.	40,447	9.6
Expenses.....	201,295	246,279	D.	44,984	18.3
Net earnings.....	$180,615	$176,078	I.	$4,537	2.6
Earnings per mile.	1,752	1,937	D.	185	9.6
P. c. of expenses...	52.70	58.31	D.	5.61	9.6
New Jersey South'n.	393,806	.....		.....	.....
Expenses...	338,259	.....		.....	.....
Net earnings.....	$55,547	.....		.....	.....
Earnings per mile.	2,263	.....		.....	.....
P. c. of expenses...	85.90	.....		.....	.....
Pittsburgh, Titus'lle & Buffalo..... ..	687,073	$706,019	D.	$18,946	2.7
Expenses.....	427,909	455,828	D.	27,919	6.6
Net earnings.....	$259,164	$250,191	I.	$8,973	3.6
Earnings per mile.	5,975	6,139	D.	164	2.7
P. c. of expenses..	62.29	64.56	D.	2.27	3.5
Sussex.....	102,734	95,100	I.	7,634	8.0
Expenses.....	65,369	58,526	I.	6,843	11.7
Net earnings.....	$37,365	$36,574	I.	$791	2.2
Earnings per mile.	2,935	2,717	I.	218	8.0
P. c. of expenses..	63.65	61.50	I.	2.15	3.5
Year ending March 31:	1877-78.	1876-77.			
Georgia.....	$1,013,713	$1,143,128	D.	$129,415	11.3
Expenses.....	727,700	643,110	I.	84,590	13.2
Net earnings.....	$286,013	$500,018	D.	$214,005	42.8
Earnings per mile.	4,388	4,949	D.	561	11.3
P. c. of expenses..	71.77	56.26	I.	15.51	27.6
Eleven Months ending April 30:					
Chicago & Northw'n.	$12,205,998	$11,138,101	I.	$1,067,897	9.6
Four Months ending April 30:	1878.	1877.			
Atchison, Topeka & Santa Fe	$955,983	$661,025	I.	$294,958	44.6
Bur., Cedar Rapids & Northern.....	553,026	287,683	I.	265,340	92.2
Central Pacific.....	4,483,410	4,799,819	I.	33,591	0.7
Chicago & Alton....	1,289,350	1,361,493	D.	72,143	5.3
Chi., Milwaukee & St. Paul.....	2,822,000	1,762,788	I.	1,059,212	60.1
Grand Trunk.....	2,968,959	2,841,414	I.	127,545	4.5
Great Western.....	1,504,757	1,288,393	I.	216,364	16.8
St. L., I. Mt. & So....	1,368,400	1,368,291	I.	109	.....
Three months ending March 31:					
At., Miss. & Ohio....	$389,577	$379,849	I.	$9,728	2.6
Gal., Harrisburg & San Antonio.....	265,039	233,423	I.	31,616	13.5
Louisville & Nash'e.	1,350,281	1,297,795	I.	52,486	4.0
Mobile & Ohio.....	626,537	545,462	I.	81,075	14.9
St. Paul & Sioux City	130,669	91,202	I.	39,467	43.3
Sioux City & St. Paul	87,621	52,391	I.	35,230	67.2
Month of March:					
At., Miss. & Ohio....	$129,105	$131,873	D.	$2,768	2.1
Gal., Har. & San Antonio.....	88,801	78,072	I.	10,729	13.7
Louisville & Nash'e..	440,000	419,149	I.	20,851	5.0
Mobile & Ohio.....	165,755	138,687	I.	27,068	19.5
St. Paul & Sioux City	48,861	31,196	I.	17,665	56.6
Sioux City & St. Paul	33,486	19,315	I.	14,171	73.4
Month of April:					
Atchison, Topeka & Santa Fe.....	$290,500	$200,681	I.	$80,819	40.3
Bur., Ced. R. & Nor.	115,277	72,435	I.	42,842	59.2
Central Pacific.....	1,510,000	1,438,650	I.	71,341	5.0
Chi. & Alton.....	330,613	339,384	D.	8,771	2.6
Chi., Mil. & St. Paul.	785,000	514,783	I.	270,217	52.5
Chicago & Northw'n.	1,108,369	867,603	I.	240,766	28.9
St. L., I. Mt. & Sout'n	287,200	287,903	D.	703	0.2
Third Week in April:					
Denver & Rio Gr....	$18,438	12,972	I.	$5,466	42.1
Wabash.....	81,023	99,720	D.	18,697	18.8
Week ending April 26:					
Gt. West., of Can....	$77,415	$95,672	D.	$18,257	19.1
Week ending April 27:					
Grand Trunk.....	$157,072	$183,848	D.	$26,776	14.6

Chicago and Missouri River Business.

At the meeting held in Chicago, May 4, a settlement of the differences on the Missouri River business was agreed upon. A new association is to be formed, called the Southwestern Railway Association, which is to control all business going east from Kansas City, Leavenworth, Atchison or St. Joseph, and west to those points through St. Louis, Louisiana, Hannibal, Quincy, Burlington, Davenport or Chicago. The business is to be divided, the Chicago roads to take 45 per cent., the St. Louis roads 45 per cent., and the Hannibal & St. Joseph 10 per cent. Any road receiving more than its allotted proportion may retain 40 per cent. of the earnings. The Wabash is to be recognized as the eastern connection of the Hannibal & St. Joseph.

The following rates per 100 lbs. were agreed upon on west-bound freight to the Missouri River points named:

	1st class.	2d class.	3d class.	4th class.	Special.
From Chicago.....	85	70	45	30	25
" St. Louis.....	65	50	35	25	20

Full rates are to be charged on Colorado business.

Cincinnati Passenger Rates.

A Cincinnati dispatch says that the competition for eastward-bound travel from that city has been ended, and all the lines have agreed to charge schedule rates for passengers. The war has been very lively for a short time and passenger rates were cut down to a very low point.

Grain Movement.

For the week ending April 27 receipts and shipments of grain of all kinds were:

	1878.	1877.	Inc. or Dec.	P. c.
Northwestern receipts.	3,488,560	3,002,595	I. 485,965	16.2
" shipments.	3,034,035	3,982,417	D. 948,382	23.8
Atlantic receipts.....	3,037,286	2,858,970	I. 178,316	6.2

Northwestern receipts are the smallest for five weeks, and light for any year of tolerable crops so soon after the opening of navigation. Northwestern shipments are less than last year for the first time for several months. They are the smallest since navigation opened, and smaller than in 1876 as well as 1877. Of these shipments 29.8 per cent. were by rail this year, against 33.4 in 1877, 56 in 1876, 96 in 1875 and 58 in 1874. In several of these latter years navigation was not open the whole week.

Receipts at Atlantic ports are larger than the previous week, but smaller than in any other week since the middle of January. This is due, doubtless, to the fact that rail receipts had largely ceased, and canal receipts at New York had not fairly begun. Of these Atlantic receipts, 30.9 per cent. arrived at Philadelphia, 27 at Baltimore, 23.2 at New York, 11.5 at Boston, 7.1 at New Orleans, 0.2 at Montreal, and 0.1 per cent. at Portland. New York's receipts for this week and the previous one have been smaller but once in twelve months. On the other hand, Baltimore's are much above its average, and Philadelphia's have been exceeded but once this year and once last year. New York may be expected to recover, with interest, as soon as canal deliveries have fully begun.

For the four months from Jan. 1 to April 27 receipts and shipments have been, flour in barrels and grain in bushels:

	1878.	1877.	Increase.	P. c.
Flour:				
Northwestern receipts.	1,911,139	1,505,825	555,814	41.0
" shipments.	1,909,980	1,298,527	611,453	47.0
Atlantic receipts.....	9,732,733	9,147,189	562,544	27.1
Wheat:				
Northwestern receipts.	18,157,452	5,225,301	12,932,151	247.5
" shipments.	11,265,408	4,038,048	7,227,360	179.0
Atlantic receipts.....	19,822,119	1,873,763	17,948,356	958.0
Corn:				
Northwestern receipts.	23,479,232	20,585,868	2,893,364	14.1
" shipments.	17,130,979	13,220,218	3,910,761	29.6
Atlantic receipts.....	32,491,913	24,825,108	7,666,805	30.9
Grain of all kinds:				
Northwestern receipts.	51,525,082	32,799,670	18,725,312	57.1
" shipments.	33,694,465	21,862,053	11,832,412	54.1
Atlantic receipts.....	60,102,502	32,338,234	27,764,268	85.9

Baltimore grain receipts for April are as follows, flour in barrels and grain in bushels, flour being reduced to wheat in the totals:

	1878.	1877.	Inc. or Dec.	P. c.
Flour.....	97,304	116,450	D. 19,146	16.4
Wheat.....	749,836	88,742	I. 661,094	745.0
Corn.....	2,449,926	2,758,354	D. 308,428	11.2
Other grain.....	97,163	71,347	I. 25,816	36.2
Total.....	3,783,445	3,500,693	I. 282,752	8.1

For the four months ending April 30 the receipts were:

	1878.	1877.	Increase.	P. c.
Flour, barrels.....	421,513	383,483	38,030	9.9
Grain, bushels.....	12,095,787	10,198,119	1,897,668	18.6
Total, bushels....	14,203,352	12,115,534	2,087,818	17.2

April exports were 46,363 barrels flour, 674,964 bushels wheat, and 2,532,046 bushels corn.

Coal Movement.

Coal tonnages are reported as follows for the four months ending April 27, the tonnage in each case being that originating on the line to which it is credited:

	1878.	1877.	Inc. or Dec.	P. c.
Anthracite:				
Philadelphia & Reading.	841,993	1,519,739	D. 677,746	44.6
Northern Central, from Shamokin Div., and Summit Br. R. R.....	153,926	146,760	I. 7,166	4.9
Danville, Hazleton & Wilkesbarre.....	3,810	5,625	D. 1,815	32.4
Pennsylvania Canal.....	32,448	35,651	D. 3,203	9.0
Central of N.J., Le'h Div.	553,346	878,224	D. 324,878	37.0
Lehigh Valley.....	830,471	1,117,106	D. 286,635	25.7
Penn. & New York.....	7,523	14,489	D. 6,966	48.1
Del., Lacka. & Western.	520,264	623,635	D. 94,371	15.1
Del. & Hudson Canal Co.	651,777	641,755	I. 10,022	1.6
Pennsylvania Coal Co...	108,345	299,397	D. 131,0 2	43.8
State Line & Sullivan...	9,913	3,874	I. 6,039	155.9
Total anthracite...	3,782,816	2,286,255	D. 1,503,439	28.4
Semi-bituminous:				
Cumberland, all lines...	306,914	326,106	D. 19,192	5.9
Huntingdon & Br'd Top.	44,616	48,719	D. 4,103	8.4
East Broad Top	22,542	35,031	D. 12,489	35.7
Tyrone & Clearfield.....	390,544	437,751	D. 47,207	10.8
Bellefonte & Snow Shoe	10,060	15,663	D. 5,603	3.6
Total semi-bitum's	774,676	863,270	D. 88,594	10.3
Bituminous:				
Barclay.....	100,359	116,877	D. 16,518	14.1
Allegh'y Region Pa. R.R.	62,783	64,300	D. 1,517	2.4
Penn and Westmoreland gas coal.....	243,330	250,560	D. 7,230	2.9
West Pennsylvania R. R.	69,269	194,311	I. 3,483	1.8
Southwest Penn. R. R..	9,687			
Pitts'rgh Region, Pa. R.R.	118,838			
Total bituminous..	604,266	626,048	D. 21,782	3.5

The anthracite production shows very decidedly the reduction caused by the agreement between the companies.

In bituminous an increased demand for coal for steam and manufacturing purposes is reported. In gas coals the demand is light. Unusually large importations of English gas coal to Boston are reported.

Cotton Movement.

Receipts for the eight months of the crop's year, from Sept. 1 to April 30, have been, in bales:

1877-78.	1876-77.	1875-76.	1874-75.	1873-74.
4,099,790	3,834,786	3,921,275	3 319,082	3,549,894

This shows the receipts this year to have been 4½ per cent. greater than ever before.

Norfolk Cotton Business.

Norfolk cotton receipts for April, were 28,601 bales, an increase of 18,630 bales, or 186.8 per cent., over April, 1877. For the eight months of the cotton year, from Sept. 1 to April 30, the receipts were, in bales:

	1877-78.	1876-77.	Inc. or Dec.	P. c.
At., Miss. & Ohio R. R..	205,029	205,835	D. 806	0.4
Seaboard & Roa'ke R R.	163,044	245,365	D. 82,321	33.5
Canals and otherwise...	40,615	40,138	I. 477	1.2
Total	408,688	491,398	D. 82,710	16.8

Of the receipts this year 184,313 bales were local cotton consigned to Norfolk, and 224,375 bales were bound through to points beyond.

East-Bound Freight Rates.

Chicago dispatches of May 3 reported some cutting in east-bound rates. It appears that grain to New York has been taken for about a week quite generally at 20 cents, the regular rate being 25 cents.

At latest advices the cutting at Chicago still continued, and rates were reported at 18 cents per hundred on grain to New York, with every probability of a fall to 15 cents.

At a meeting held in St. Louis, May 4, to consider how to protect the interests of the St. Louis lines against the cutting of rates by the Chicago lines to the East, there were present representatives of the Chicago & Alton, the Wabash, the Indianapolis & St. Louis, the Vandalia Line and the Ohio & Mississippi. It was resolved to make fourth-class rates 26 cents per 100 lbs. to Baltimore, 27 to Philadelphia, 29 to New York and 33 to all New England points. Grain rates were fixed upon the basis of 23 cents per 100 lbs. to New York.

RAILROAD LAW.

The Central Vermont Case.

The following is the official summary of the points in the decision given by the Vermont Supreme Court last October in the case of the Vermont & Canada Company against the Vermont Central and others:

"Judgments and decrees, otherwise invalid, often become binding and effectual by the consent and acquiescence of parties affected by them, and especially when they have been actually executed and carried into effect.

"Proceedings by petition, as distinguished from original bill are proper in closing a receivership administration.

"The original receivership of the Vermont Central and Vermont & Canada railroads, established by the final decree of 1861, was proper, as being a case of absolute necessity for the enforcement of the security of the Vermont & Canada Company upon the earnings of the two roads for its rent, and was designed to continue only until the arrears should be paid.

"The occasion and purpose of the receivership ceased, when the parties in 1864 arranged for the satisfaction of these arrears, and provided by a so-called compromise decree, entered by consent, for a new and continuing system of tenure and management.

"A receivership should be temporary, and to serve an exigency; the court will not assume the execution of a continuing business or private enterprise. In a receivership a lien for a receivership debt, which shall take precedence over existing liens, should not be created or upheld, except when expressly ordered in advance, with the consent of the prior encumbrancers, and, in case of absolute necessity, for the preservation of the property and securities.

"In determining the respective rights of present claimants the Court will look to the substance and reality of each transaction had, and of the successive and special securities pledged and taken.

"The successive transactions having all been matters of open record in the office of the Court of Chancery, all parties interested are chargeable with notice thereof, and must stand with such rights as exist in them respectively, resulting from the reality of the transactions by which they are affected.

"There can be no priority among debts of the management of the property in question, under the so-called compromise decree, but all stand alike upon the promise of the managing party in view of ability and means for payment.

"In a receivership for realizing profits only, there is no authority for the sale of the corpus of the estate to pay charges incurred in the management.

"In no event would a sale be ordered without opportunity for redemption.

"Petition for sale refused, there being no principle on which the so-called trust debt can be established as a receivership-lien as claimed in the petition, and the managing party under the decree of 1864 not being regarded as a receiver in the sense of the law, but as having the character and office of an administration trust by agreement of the parties."

Garnishment Process against a Railroad Company.

In the case of Steiner and other against the Central Railroad & Banking Company, the Georgia Supreme Court lately held:

1. On exceptions taken and entered *pendente lite*, there can be no adjudication in the Supreme Court while the case is pending below.

2. Service of garnishment on a domestic corporation whose President resides in this state, must be upon the President, and cannot be effected upon a subordinate officer or agent, though the President be temporarily absent.

3. Where the return of service shows upon its face that the President was not served, and does not show that he was a non-resident, the plaintiff is not entitled to judgment against the corporation for failing to answer the garnishment.

4. Writ of error to this court at the instance of plaintiff in garnishment is premature while the case is pending below on a traverse of the garnishee's answer.

5. Were the writ of error retained, the judgment which the plaintiff complains of would be affirmed; but the writ being premature, it is dismissed as the more correct practice in such cases.

Writ of error dismissed.

Actions By and Against Receivers.

The *Southern Law Review* collects the following recent decisions as to actions brought by or against receivers. Appended to each is the title of the action, and the State in whose courts the decision was given:

A receiver has no right to sue without express authority from the Chancellor, and when he sues he must show the order which empowers him to sue.—*Screven vs. Clark, Georgia.*

If a receiver is not authorized to sue by the judgment or order appointing him he may be authorized by a subsequent order.—*Lathrop vs. Knapp, Wisconsin.*

In Maryland a receiver need not have an order of Court to sue, but this depends upon a statute which makes it the duty of the receiver to take charge of and sell the property and collect debts, and holding them liable for their "neglect, default or malfeasance in office."—*Everett vs. State, Maryland.*

The record evidence of the appointment of receiver is conclusive, and while it remains a subsisting order of Court it is not competent for any one to question it except by appropriate proceedings to test its validity.—*Vermont & Canada vs. Vermont Central, Vermont.*

A receiver is an officer of the Court which appoints him, but cannot sue in a foreign jurisdiction for the property of the debtor.—*Warren vs. Union National Bank, Pennsylvania.*

A receiver may sue in his own name without leave of Court.—*Iglehart vs. Bierce, Illinois.*

If a receiver is not authorized by statute, or, in a proper case, by the Court appointing him to sue, he must bring the action in the name of the party in whom the right of action lies.—*Manlon vs. Burger, Indiana.*

A receiver cannot, in equity, sue in his own name, but must sue, if at all, in the name of the party having the legal right. At law he can sue in an action of ejectment, on leave granted for that purpose.—*Freeman vs. Winchester, Mississippi.*

A receiver cannot commence any action for the recovery of outstanding property, belonging to an estate over which he has been appointed, without an order of the Court, and when such order is made the action must be brought in the name of the legal owner; and he will be compelled to allow the use of his name upon being properly indemnified out of the estate and the effects under the control of the Court. —*Battle vs. Davis, North Carolina.*

A receiver appointed by a United States Circuit Court to take possession of a railroad and its effects may bring suit in the Superior Court of Cincinnati, upon a contract made by that railroad in its corporate name, without disclosing in the petition his name as receiver.—*United States Circuit Court, Southern District of Ohio.*

A railroad company in repairing its road left a dangerous excavation unprotected, into which plaintiff drove and was injured. *Held*, that the receiver of the road could be sued, the same as the company if it operated its own road. To bring an action against a receiver it is not necessary to give notice of the application for the order to the parties in the the case. Notice to the receiver is sufficient.—*Porter vs. Bunnel, Ohio.*

If receivers willfully and corruptly exceed their powers, they should only be held liable for the actual damages sustained by their conduct.—*Stanton vs. Alabama & Chattanooga Co., United States Circuit Court.*

1. A sum of money having been ascertained to be due by the receiver and ordered by the Court to be paid in, and no motion having been made by the receiver or his sureties to set aside or vary that order, it is competent evidence against both the receiver and sureties, both of a breach of his bond and of an amount due from him upon such breach for which they are responsible. 2. A receiver holds the property not in his own right, but as the officer and representative of the Court. But that affords no reason for holding him or his sureties to a less degree of responsibility.—*Commonwealth vs. Gould, Massachusetts.*

The responsibility of a public receiver is determined not by the law of bailment, but by the condition of his bond; and where the funds in his possession were stolen his sureties are liable, even though the jury find that it was kept as a prudent man would keep his own funds.—*Commonwealth vs. Comly, Pennsylvania.*

THE SCRAP HEAP.

Railroad Manufactures.

The Atlantic & Gulf shops, at Savannah, Ga., recently completed two new sleeping cars for use on the Florida line.

The rolling mill and forge at Rockaway, N. J., are running on full time.

Porter, Bell & Co., at Pittsburgh, recently built for the Pittsburgh Southern road a 19-ton mogul engine of 3 ft. gauge in ten working days, exclusive of the time required for painting. The engine was delivered to the company May 1. Porter, Bell & Co. have issued a new work called "Light Locomotives," giving details of the construction and performance of engines built by them, and also much information about narrow-gauge roads, and mining and other special roads.

The Missouri Car & Foundry Co., at East St. Louis, is building two passenger and 45 freight cars for the Memphis, Kansas & Colorado road.

The Haskell & Barker Car Co., at Michigan City, Ind., is building four passenger and some flat cars for the Dakota Southern road.

The Wason Manufacturing Co., at Brightwood, Mass., is building four passenger cars for the South Mountain Railroad.

Metcalfe, Paul & Co., of the Verona Tool Works, Pittsburgh, are supplying a large number of their Verona nut-locks to the Dom Pedro Segundo Railroad in Brazil.

A Ramsey car-shifting apparatus has been put up at Latrobe, Pa., where it is used for transferring freight cars from the standard-gauge trucks of the Pennsylvania Railroad to the narrow-gauge ones of the Ligonier Valley road.

The Eastern office of the Cleveland Rolling Mill Co., of Cleveland, O., the Union Rolling Mill Co., of Chicago, and the Kansas Rolling Mill Co., of Kansas City, Mo., has been removed from No. 20 Nassau street to No. 52 William street, New York.

The steel mill of the Burgess Iron & Steel Co., at Portsmouth, O., which was recently burned down, has been replaced with a new building and is now actively at work.

The Cherry Valley Rolling Mill, at Leetonia, O., has been leased for five years to the American Railway Supply Co.

Mr. Wm. O. Jones has left the firm of Thomas Prosser & Sons, after a connection with the house which has lasted 13 years.

The Grant Locomotive Works, at Paterson, N. J., is rapidly completing the locomotives ordered by the Gilbert Elevated road.

The Weimer Machine Works, at Lebanon, Pa., are building a new blowing engine for the Eckert Furnace at Reading. They are also rebuilding Moselem and Robesonia furnaces.

Mr. E. Miller has recently had inquiries about his patent platform and coupler from the house of Johan Koopmans & Co., of Amsterdam, Holland.

Swift's Iron and Steel Works, Cincinnati, have made 2,340 tons of iron T rails, principally 30, 35 and 40 lbs. to the yard. The largest proportion were a new wide-flange 35 lbs. rail for the Denver, South Park & Pacific, besides small lots to five other narrow-gauge roads. The works have made more of their bloom boiler iron the past four months than during the same period of any previous year.

Wilson, Walker & Co., at Pittsburgh, are running their forge department full double turn.

The buildings of the Grafton Furnace, at Leetonia, O., were destroyed by fire May 7. The loss is estimated at $75,000.

Bridge Notes.

The King Bridge Co., at Cleveland, O., is employing 150 men on full time at its Works. The company recently contracted for 550 feet of bridges in Maine, and has taken 62 contracts since May 1.

The new Morse Bridge Works, at Youngstown, O., are approaching completion and expect to start up this month. They have already secured contracts for 15 bridges.

G. W. Fishler & Co., of Elmira, N. Y., have the contract for a suspension bridge for highway travel over French Creek, at Cambridge, Pa.

The Keystone Bridge Co., at Pittsburgh, has a large force at work on the bridge over the Monongahela at Port Perry. The bridge will be 1,635 feet long and is for the connection between the Pennsylvania and the Pittsburgh, Virginia & Charleston roads.

Forty-Six Years Ago.

The following advertisements are taken from the Newark (N. J.) *Daily Advertiser* of June 27, 1832:

"A railroad in practical operation within 15 miles of the city of New York. The Paterson & Hudson River Railroad is formed from the town of Paterson to the village of Acquackanonk, a distance of four and three-quarter miles, and is now in actual and successful operation between those places. The company have placed upon the road three splendid and commodious cars, each of which will accommodate at least thirty passengers, and have supplied themselves with fleet and gentle horses and careful drivers. As the road is within ten miles of Hoboken and Jersey City, and nine of the town of Newark, it will afford the friends of internal improvement an easy and cheap opportunity of witnessing its advancement, and will much facilitate the communication between the town of Paterson and the city of New York It will be seen by other advertisements that the proprietors of stages have taken the railroad into their lines. The fare between Paterson and Acquackanonk is 1s. 6d."

"The canal packet boat, Maria Golden, Captain Bruen, will leave for Paterson on Friday next, and continue to run every day (except Sundays) until further notice. All those who wish to avail themselves of the pleasure of a trip on the railroad now in operation between Paterson and Acquackanonk will find this a good opportunity, as the boat will remain at Paterson long enough for that purpose and return the same day. The boat will leave Newark at half-past 7 o'clock, a. m., and leave Paterson at 4 o'clock p. m. Fare each way, 50 cents. To Bloomfield, 25 cents."

The Paterson & Hudson River is now a part of the Erie road. The Morris Canal is still in use, but it is many years since the last passenger boat ran upon its waters.

The Naylor Safety Valve Patent.

In Ashcroft against the Boston & Lowell Company, appeal from the Circuit Court for the District of Massachusetts, the United States Supreme Court has just decided that Naylor, from whom Ashcroft holds the patent by assignment, was not the inventor of an improvement in steam safety valves using an overhanging downward curved lip, nor was he the first to use an annular chamber surrounding the valve and its seat, and that the claims of the reissued patent, upon which the suit is based, cannot be held to cover the safety valve used by the defendant company, which is substantially different in its construction and mode of operation, as appears from a comparison of the models. The decision of the Circuit Court is therefore affirmed.

Apparatus for Registering Brakes Action.

The Engineer says: "Mr. Stroudley is now constructing, at the Brighton Works of the London, Brighton & South Coast Railway, a van for Mr. Westinghouse, which will be fitted up with the special apparatus designed by the latter gentleman for registering simultaneously all the forces brought to bear during the operation of a brake. It is a very beautifully designed piece of work, about which we shall have more to say. As an example of the ease with which the automatic brake may be fitted, we give the following facts: On the arrival at Brighton, last Saturday, of the 2 p. m. express train from London, it was taken into the shops and the whole of the eighteen six-wheeled vehicles, including the two vans, of which it was composed, were fitted complete, and the train put out of the shops on Sunday morning. On Sunday afternoon it ran an experimental trip to Worthing, working without a hitch. Mr. Stroudley has introduced some modification on the proportions of parts adopted by Mr. Westinghouse. The gear is strong enough to stand a pressure of 200 lbs. on the square inch, but 80 lbs. will skid every wheel in the train."

Paris Meeting of the British Institution of Mechanical Engineers.

The English association of this name will hold its annual meeting in Paris, June 10 to 15. There will be papers read on Tramway Engines, Continuous Brakes, Hydraulic Machinery, Lighting Spaces by Electricity, Flow of Solids, in its Practical Applications, etc.

Notes.

An Irishman, employed on a new road in Michigan, challenges the world to produce a man who can throw more dirt in a day than he can, and puts up $50 to back the challenge.

The following, from the Pittsburgh *Telegraph* is one of the worst on record: "A consumptive wants to know if the Pullman-airy cars are railly good for lung journeys."

One Chinaman does not believe in rapid transit. He fell into a flume at Placerville, Cal., and in less than a minute was carried down about a mile, swept through a tunnel 800 feet long and thrown down 40 feet into a cañon. No bones were broken, but, as he tried to rub his numerous bruises, he remarked: "Too muchee damee fast tlaveling."

A prominent railroad manager strikes the root of the trouble when he says that what his road wants is larger gross earnings. That is what a good many roads want.

About the cheapest passenger transportation to be found now is on the Hudson River, where competing lines are carrying passengers from New York to Albany, 150 miles, at 25 cents for cabin and 10 cents for deck passage. At these rates it is hardly necessary for even a tramp to walk.

OLD AND NEW ROADS.

Atlantic & Great Western.—It is reported that the New York Central is negotiating for an exchange of business with this road, and a close connection with it over the new Rochester & State Line road from Rochester to Salamanca. A party of New York Central officers this week made a trip over the road, which probably gave rise to the reports.

Atchison, Topeka & Santa Fe.—The great immigration into Kansas this year is shown in a striking manner by the land sales of this company. The April sales amounted to $184,430.71, and those for the four months ending April 30 to $416,853.39, against $19,773.91 for April and $79,436.24 for the four months in 1877. The sales for the four months are a little larger than those for the whole year in 1877. The actual cash receipts of the Land Department this year have been $83,766.86 for April and $214,314.46 for the four months, against $30,840.27 and $90,965.74 for the same periods last year.

The first section of 40 miles of the new extension from La Junta, Col., has been let to Alexander Wallace, of Danbury, Conn., and Col. C. A. De graff, of St. Paul, Minn., both well known contractors.

The company has been surveying for an extension from Pueblo, Col., westward, up the Arkansas to Cañon City and thence to a point in the San Juan mining region. The Denver & Rio Grande already has a line from Pueblo to Cañon City, 40 miles.

Topeka dispatches state that contracts have been all let for the extension to Clifton, N. M., the line to be completed to Trinidad, Col., by Aug. 15, to the summit of the Raton Mountain by Nov. 1, and to Clifton by Feb. 1, 1879. Contracts have also been let for 305,000 ties and all the iron required.

Augusta & Knoxville.—The contract for grading this road from Augusta, Ga., up the Savannah River to Walton Island, 17 miles, and for building the bridge over the canal at Augusta has been awarded to Wm. D. Grant, of Atlanta, Ga. Work is to be begun by June 1, and finished before April 1, 1879.

Buffalo City.—This company was organized some time ago for the purpose of building a railroad across the city of Buffalo to connect all the roads entering the city. It is locally known as the Crosstown road. Recently a contract for its construction has been let to Richard Taylor, of Guelph, Ont., and G. W. Phelps, of Mt. Morris, N. Y. The whole length of the road from the International Bridge to the Buffalo, New York & Philadelphia junction will be about seven miles.

Burgaw & Jacksonville.—It is proposed to build a railroad from the Wilmington & Weldon at Burgaw, N. C., east by north to Jacksonville in Onslow County, a distance of about 40 miles. Meetings are being held to secure subscriptions along the line.

Canadian Pacific.—Chief Engineer Sanford Fleming has reported in favor of Burrard Inlet, British Columbia, as the western terminus of this road. He recommends it as having the best harbor and as being accessible by the most direct and least expensive line from the interior.

Celina, Van Wert & State Line.—This company has been organized to build a narrow-gauge road from Shanesville, O., on the line of the proposed Columbus & Northwestern, northward through Van Wert, Paulding and Bryan counties to the Michigan line, about 75 miles.

Central, of Iowa.—Railroad officers are notified that cars marked "B [D] Coal Co., C. R. R. of Iowa," are the property of the Consolidation Coal Company. It is requested that mileage of these cars be kept separately from that of Central Railroad of Iowa cars, and reported to J. R. Cavanaugh, Car Accountant, at Marshalltown, Iowa.

The late receiver, Mr. J. B. Grinnell, has issued the following circular to the officers and employés of the road:

"GENTLEMEN.—It is near two and one-half years since I was unexpectedly called to be Receiver of the Central Railroad of Iowa, and my continuance in this position has been as unexpectedly prolonged. The resignation long since tendered has been accepted to take effect May 1, and Mr. H. L. Morrill, a gentleman of railroad experience and of high repute, is appointed my successor, to whom you will report from this date.

"In sundering this relation, it is a pleasure to recognize the undoubted integrity of the station agents now in service as evidenced by the correctness of their balances. Also that exemption from any serious accident for more than two years, involving loss of property or injury to person, which reflects the highest credit upon the telegraph operators, trainmen and employés on the track and in the car and machine shops. I accord to the heads of departments all praise for that pleasant comity in business which has been maintained with other railroads, and hope that the public which you have served with fidelity and skill, and the bondholders whose property under adverse circumstances you have guarded from loss and appreciated in value, will ever hold you in the highest esteem.

"The Receiver, for good fortune and success claims nothing for himself beyond sincere devotion in the discharge of duty, and having no recollection of an unkind word spoken in social or business relation by an employé, apart from official merit finds great pleasure in commending all as friends to the considerate regard of his successor."

Central of New Jersey.—It is stated that the assents to the plan of adjustment received up to May 3 included $14,676,000 consolidated bonds out of $20,000,000; $13,343,000 stock, $4,202,000 Lehigh & Wilkesbarre bonds, and $2,100,000 American Dock & Improvement bonds.

Chicago & Paducah.—Receiver Ellery reports for February and March as follows:

Balance, Feb. 1	$8,009.81
Receipts	32,393.36
Total	$40,403.17
Disbursements	36,032.45
Balance, April 1	$4,37 .72

The disbursements exceeded the receipts by $3,639.09 for the two months.

Cincinnati & Portsmouth. — Concerning a recent item respecting the decision of the Ohio Supreme Court in the suit of Rutherford & Co. against this road a correspondent writes: "The report of the trial is wrong. The lower court decided in the case of Rutherford & Co. against the Cincinnati & Portsmouth Company and others (the latter interveners), that the lien law of the State did *not* cover the case of a railroad, which decision was affirmed by the higher Court, in full bench, on appeal of Rutherford & Co."

Cincinnati Southern.—The proposed new loan of $2,000,000 to complete this road was defeated by the people of Cincinnati by a small majority at the election held May 3. There was only a light vote cast. It is said that many people either did not vote or voted against the loan on account of a feeling of dissatisfaction with the management of the trustees, rather than from opposition to the completion of the road.

The Chamber of Commerce has passed resolutions approving a reorganization of the board of trustees and the passage of a law to authorize the formation of a company to furnish capital to complete the road, the company to be guaranteed interest on capital, and to make a division of the profits with the city. A committee was appointed to prepare plans for the completion of the road.

Covington, Columbus & Black Hills.—A suit to foreclose a mortgage for $120,000 on this road was recently begun in the United States Circuit Court by George T. M. Davis, of New York. On May 6 the Court made an order appointing H. K. Lane, President of the First National Bank of Des Moines, Ia., Receiver. The road is of 3 ft. 6 in. gauge, and is completed from Covington, Neb., to Ponca, 26 miles; something has been done toward an extension westward. Besides the mortgage debt there is said to be a floating debt of about $75,000.

Corsicana & Palestine.—This company has been organized to build a railroad from the Houston & Texas Central at Corsicana, Tex., east by south to Palestine on the International & Great Northern, a distance of 54 miles. Surveys of the line have been begun. The line will pass through the pine belt of Eastern Texas.

Danville, Olney & Ohio River.—Track has been laid on this road from Kansas, Ill., on the Indianapolis & St. Louis road, south by west to Westfield, about 10 miles. Excursion trains have been run over the line, and regular trains were to be put on this week.

Detroit, Lansing & Northern.—The contract for grading the extension of the Stanton Branch from McBride's, Mich., north to Blanchard's Dam, 13 miles, has been let to Wells & Co., of Chicago. The work is to be done by Sept. 1. The extension is through a heavy pine country.

Denver Pacific.—The United States Circuit Court at Denver, Col., last week announced that it would so modify the order recently made, by which Messrs. Edgerton and Clayton were appointed Receivers of the road, as to leave the control of the land contracts of the road, and the money realized from them, in the hands of the trustees, and to restrain

the Receivers from paying over any moneys to the Kansas Pacific road or its receivers.

Dubuque Southwestern.—It is reported that the Chicago, Milwaukee & St. Paul Company has secured control of this road, which runs from Farley, Ia., southwest 56 miles to Cedar Rapids. The St. Paul Company's Sabula, Ackley & Dakota line connects with the road at Marion, six miles from Cedar Rapids.

Duxbury & Cohasset.—The stockholders have voted to accept the act of the Massachusetts Legislature, authorizing the company to sell its road to the Old Colony Railroad Company.

Empire, Clarksville & Nashville.—This company has filed articles of incorporation in Tennessee, the line of the road beng apparently from Nashville west by north to Clarksville, about 45 miles. The incorporators are A. C. Blackman, J. B. Druillard, D. N. Kennedy, R. S. Broaddus, J. P. Helms, J. M. Graham, E. F. Falconnet and L. S. Goodrich.

Erie.—In the New York Supreme Court, May 3, application was made by Receiver Jewett for a final accounting and a release of his sureties. Decision was reserved until the following day. The trustee under the foreclosed mortgage approved the application.

On May 7 the court made an order approving Mr. Jewett's accounts and directing him to turn over the assets in his hands to the new company. He is, however, continued as Receiver, but only for the purpose of making final settlements and prosecuting or defending suits already begun.

The court has awarded $5,600 as compensation for the trustee and counsel in the suit to foreclose the first consolidated mortgage, which was discontinued

In the Bischoffsheim suit to recover $103,648 as commission on the exchange of certain bonds, the Court has denied a motion to require the Receiver to deposit funds to meet a possible judgment.

Receiver Jewett has begun suit in Chicago to set aside a certain contract with Charles Robinson as President of the National Stock Yards Company, and to recover $53,000 paid to Robinson under it. The complaint charges that Robinson was paid for the purchase of certain stock from other parties, and also for expenses incurred by him in building up the business of the company, when in fact the stock was only borrowed and no money had been spent by him.

Evansville, Washington & Worthington.—Two companies, one under this name, and one called the Chicago, Worthington & Washington, have filed articles of incorporation in Indiana. Both have the same incorporators and officers, and the articles cover a railroad from Evansville, Ind., by way of Washington and Worthington to Terre Haute, about 125 miles, on the line of the Wabash & Erie Canal.

Illinois & St. Louis Bridge.—A bill has been filed in the United States Circuit Court at St. Louis to foreclose the second mortgage on this company's property.

Indianapolis, Bloomington & Western.—A dispatch from Chicago, May 8, says: "On the application of the Bondholders' Committee of New York, Judge Drummond to-day amended the decree in the Indianapolis, Bloomington & Western Railroad foreclosure case so as to allow the sale of the road subject to the six months' claims."

Kansas Pacific and the Union Pacific.—A dispatch from Omaha, May 8, says: "In the case of the Kansas and Denver Pacific against the Union Pacific Railroad Company to compel the latter to pro-rate, Judge E. S. Dundy, in the United States Court, to-day decided adversely to the plaintiffs. He held that the Denver Pacific was a branch of the Union Pacific; also, that the building and operating expenses west of Cheyenne, being greater than on the east end of the road, entitled the Union Pacific to a greater rate per mile on business received at Cheyenne than on through business, and that the Union Pacific did not discriminate against other roads in applying this rule."

Kalamazoo, Lowell & Northern Michigan.—The directors have voted to accept the offer made by J. G. French, of Montpelier, Vt., to build this road from Kalamazoo, Mich., northward through Hastings to Lowell, nearly 50 miles, for $425,000 in bonds and $107,500 in cash. The road is to be of standard gauge, instead of 3 ft., as formerly intended.

Keokuk & Des Moines.—Concerning the reports as to a sale or lease of this road, the Keokuk (Ia.) *Gate City* says: "The situation of affairs in the matter of the proposed lease is about as follows: The negotiations which the Chicago, Rock Island & Pacific were conducting are off—at least, Mr. Riddle, the President of the company, has returned from New York without having accomplished anything, although it is not impossible that terms may yet be agreed upon. The present negotiations are not with the St. Louis, Keokuk & Northwestern proper, but with parties who are interested in that road. The Keokuk & Des Moines people have made a proposition to them upon the basis of a 45 years' lease, which, if consummated, will practically amount to a sale. The two roads would be virtually consolidated and operated as one line under one management. The shops of the two companies would be consolidated and retained here, and this would continue to be the headquarters of the two roads. It has been reported that the Wabash is also negotiating for the road, but this rumor can be traced to no reliable source."

Mont Alto.—Work has been begun on an extension of this road from Mont Alto, Pa., south through Altodale and Quincy to Waynesboro, a distance of 7½ miles. The road is a branch of the Cumberland Valley and is now 10½ miles long from the junction with that road to Mont Alto.

New Orleans, Mobile & Texas.—A dispatch from New Orleans, May 4, says that application has been made by attorneys for Morgan's Louisiana & Texas road for an order to set aside the order for the sale of the New Orleans, Mobile & Texas road west of the Mississippi; also for leave to proceed for the condemnation of the graded road-bed, right of way, etc., west of Vermillionville, La., to be used in an extension of Morgan's road from its present terminus at Morgan City to the Sabine River.

New Orleans Pacific.—The Supreme Court of Louisiana has decided that the law authorizing the issue of $2,000,000 bonds in aid of this road is constitutional and that the issue will not make the State debt exceed the limit of $15,000,000. Accordingly the Court orders the issue of a *mandamus* directing the State Auditor to deliver the first installment of $250,000 to the company. The suit was a friendly one, the State officers not being opposed to the issue, but desiring to have the constitutional question decided before they issued any of the bonds.

New Orleans, Texas & Colorado.—A company by this name has been organized to build a line from New Orleans westward into Texas, and thence to some point in Western Texas or Colorado not as yet decided on.

New York & New England.—The bill providing for a State loan of $6,000,000 to this company was last week defeated in the lower house of the Massachusetts Legislature by the decisive vote of 173 to 56. The discussion was sharp but not long, and much interest was taken in the question, only 10 members failing to vote.

New York Terminal Facilities.—The first use made of the permission to use the Belt Railroad in New York as a freight line has been by the White Star Steamship Line. A track has been laid from the Belt road in West street to and on the dock of this line, and the cars of the New York Central are now run upon the dock directly alongside of the steamers, and there loaded and unloaded.

Paducah & Memphis.—The bondholders, for whom the road was bought at the foreclosure sale, met in Memphis, Tenn., April 30, and organized the Memphis, Paducah & Northern Railroad Company. The completed road owned is in two sections, one from Paducah, Ky., south by west to Trimble, Tenn., 78 miles, the other from Memphis, Tenn., north by east to Covington, 37 miles. There is a gap of 53 miles between Trimble and Covington, most of which is graded, and it is understood that the new company will soon complete the line.

Parker & Columbia Pipe Line.—A Philadelphia report says: "Several Philadelphia capitalists and a number of wealthy men in Oil City have purchased the right of way for an oil-pipe line between Parker City and Columbia. At the latter point connection is to be made with the Philadelphia & Reading Railroad, which company will ship the oil to this city. * * It is the intention of the projectors of this new enterprise to lay at once one six-inch pipe between the places named, and this will afford facility for the shipment of one-fourth of the entire production of the region. The capacity of the pipe will be about 12,000 barrels per day, and it is proposed to begin the work at once so that active shipments may be inaugurated by the end of the summer. Arrangements have been effected with the Philadelphia & Reading Railroad Company, which will, it is stated, carry the oil from Columbia for 10 cents per barrel to this city, and 20 cents to New York."

Pennsylvania.—The grading of this road has been completed and the track is now being laid. It is eight miles long, from the Virginia Midland road near Ward's Springs, Va., to Crider's Mill in Pittsylvania County. It passes through a heavily timbered section of country.

Peekskill & Brewster's.—Surveys are being made for a railroad from the Hudson River at Peekskill, N. Y., east by north to Lake Mahopac and thence to Brewster's on the Harlem Road. The distance is about 25 miles.

Pierce City & Northwestern Arkansas.—A contract is reported let for the grading of this road from Pierce City, Mo., the junction of the St. Louis & San Francisco and the Missouri & Western roads, southward to Fayetteville, Ark., a distance of about 75 miles. Work is to be begun this month.

St. Croix Land Grant.—Evidence is now being taken before a Master in the complicated suit for the division of this grant made years ago to the State of Wisconsin. The suit was originally brought by the Madison & Portage Company as claimant to some of the lands, and the defendants are the West Wisconsin, the Chicago, Portage & Superior and the North Wisconsin companies, all claimants of parts of the grant, the Wisconsin Central, whose land grant crosses and overlaps the St. Croix grant, and the State Treasurer of Wisconsin, as custodian of the money derived from stumpage. The Master's report is expected to be ready about June, when it will be submitted to the United States Circuit Court, but it is thought that the case will certainly be carried up to the Supreme Court.

Savannah & Charleston.—In the suits against this company the South Carolina Court of Common Pleas has entered a decree ordering that all the property of the company be sold by W. D. Porter, Master, at such time and on such terms as the Court may hereafter direct. The sale will be absolute, and all parties in the case are thereby to be barred of any equity of redemption or other right in the property. The report of the Master as to the various liens on the property is approved, except as to the Gillison, Gregory and Blake claims, which have been compromised by order of the Court, and the proceeds of the sale will be applied to the payment of the claims in their order, any surplus to be held subject to further order of the Court.

The Court holds that the State of South Carolina must be held as a party as to its claim for taxes and as representative of the holders of bonds and coupons guaranteed by it under the act of 1856.

Shenandoah Valley.—At the annual meeting in Winchester, Va., May 1, the board reported that a contract had been concluded with John Satterlee & Co., of New York, to build the road from the Potomac River, at Shepherdstown, W. Va., south by west to the Chesapeake & Ohio, at Waynesborough, Va., with the branch to Martinsburg. The whole length of road to be built is about 125 miles, and the work is to be done in three years.

The report was approved, and the old officers reëlected. A protest was made against the voting of certain stock held by J. R. Taylor, trustee, but it was withdrawn after the meeting. It was ordered that all delinquent stockholders be notified to pay up their subscriptions within 60 days.

The terms of the contract are not made public. The road was projected as a line up the Shenandoah Valley, and has been always considered as in the interest of the Pennsylvania Railroad Company. The route is parallel to and generally east of the Valley Branch of the Baltimore & Ohio and the Valley Railroad. Part of it was graded six years ago, but no work has been done for several years.

Southern of Long Island.—At a meeting of bondholders in New York, May 8, a committee was appointed to prepare a plan for reorganizing the company and reducing its debt, which shall adjust the conflicting interests of the different classes of bonds. This committee consists of Messrs. D. D. Lord, T. B. Asten and J. D. Jones. Another committee, consisting of Messrs. E. P. Fabbri, Charles Fox and E. B. Hinsdale, was appointed to examine and report on the value of the company's property.

Stockton & Bodie.—It is proposed to build a narrow-gauge road from Stockton, Cal., eastward about 120 miles to Bodie in Mono County, the centre of a rich mining region. There is said to be a practicable route over the mountains by way of Sonora and the Mono Pass.

Wabash.—In addition to the proceedings in which this company was enjoined from paying certain of its May coupons, the same parties have petitioned for the appointment of a receiver, and argument on this motion is to be heard in Urbana, Ill., May 11.

Mr. David J. Tysen, Jr., who has begun these suits, invites other bondholders to join with him. He charges that the road is not managed in the interest of the bondholders; that the funding of coupons, to which many consented, was in effect giving a preference to subordinate liens, and that by the reorganization the funded debt was increased instead of diminished. He also charges that no payments have been made to the consolidated sinking fund, as required by the mortgage, and that no provision has been made for paying the principal of $1,500,000 bonds which will mature during the present year. He claims that the company's published statements are deceptive and that they omit items which must be paid and thus make the charges on the income apparently much less than they really are. Finally he claims that the company is really unable to meet its liabilities, and that, unless prompt action is taken by the holders of the consolidated bonds, there will probably be actions instituted under some of the divisional mortgages, causing a number of conflicting suits, which will injure the interests of all concerned. Mr. Tysen's attorneys are Mathews, Foley, Hyatt & Rapallo, of No. 21 Cortlandt street, New York.

Western, of North Carolina.—At the recent annual meeting, resolutions were passed re-affirming the purpose of the company to extend its road to Greensboro, and favoring a consolidation with the Mt. Airy Railroad Company. At a subsequent meeting of the board a new survey was ordered for a part of the extension, and the Chief Engineer was ordered to make arrangements for building a bridge over Deep River and extending the track from Egypt, the present terminus, to the Gulf, a distance of five miles.

Western Maryland.—The holders of the second preferred bonds have agreed upon a new proposition for the sale of their bonds to the city of Baltimore at 66⅔ cents on the dollar, payable in cash or 5 per cent. city stock. The proposition will soon be submitted to the Board of Finance of the city. The board rejected a former proposition to sell at 80.

West Wisconsin.—The trustees, who bought this road at the foreclosure sale in March, have transferred the property to a new corporation organized by the persons interested in the purchase. The name of the new company is the Chicago, St. Paul & Minneapolis Railway Company; its capital stock is $5,000,000, of which $1,000,000 is preferred and $4,000,000 common stock. It is understood that the Chicago & Northwestern interest in the road is the controlling one. The road owned by the new company extends from Elroy, Wis., to Hudson, 177.5 miles, and it uses the St. Paul, Stillwater & Taylor's Falls road from Hudson to St. Paul, 24 miles. It forms the Chicago & Northwestern's line to St. Paul.

A circular from Wm. H. Ferry, Receiver, after noting the organization of the new company as above, says:

"All business transacted with this road prior to the first day of May, A. D. 1878, will be settled with the Receiver. All business dating on and after May 1, A. D. 1878, will belong to and be settled with the Chicago, St. Paul & Minneapolis Railway Company.

"The same officers who have been acting for the Receiver will continue to act for him in closing his accounts. The Receiver requests all parties having claims against the road incurred during his receivership to forward the same to this office for settlement at the earliest day practicable, and to pay all balances for any business transacted prior to May 1 on presentation of drafts drawn as has been customary during the receivership.

"By request of the company, its business will be transacted until you are differently advised, with the gentlemen heretofore named as the officers of the Receiver."

ANNUAL REPORTS.

Grand Trunk.

The report of this company for the half-year ending Dec. 31, covers the whole system of 1,388¼ miles worked, comparisons being made with the corresponding half of 1876. The earnings and expenses for the half-year were as follows:

	1877.	1876.	Inc. or Dec.	P.c.
Gross earnings	£1,035,695	£916,245	I. £119,450	13.0
Less discount on American currency	10,435	22,363	D. 11,928	53.3
Balance	£1,025,260	£893,882	I. £131,378	14.7
Working expenses	769,160	716,640	I. 52,520	7.3
Net earnings	256,100	£177,242	I. £78,858	44.5
Deduct postal and military revenue due bondholders	16,659	17,045	D. 386	2.3
Net balance	£239,441	£160,197	I. £79,244	49.5

The expenses were 75.02 per cent. of earnings in 1877, against 80.17 per cent. in 1876. The expenses were divided as follows, renewals being included in maintenance.

	1877.	1876.	Inc. or Dec.	P.c.
Maintenance of way	£162,023	£115,853	I. £46,170	39.8
Maintenance of equipment	141,199	121,105	I. 20,094	16.6
Working the road	465,938	479,682	D. 13,744	2.9
Total	£769,160	£716,640	I. £52,520	7.3

For the last half-year the expenses of working the road were 45.45 per cent. of gross earnings; maintenance of road and equipment, 29.57 per cent. The increase of maintenance expenses was due to larger renewals and new equipment. Reduced to American currency the gross earnings for the half-year were $3,754 per mile; net earnings, $928 per mile.

The receipts in United States currency were $3,765,110, of which $1,174,978 were converted into gold at an average of about 104, against 111 in 1876. The loss from this source may be expected to disappear in a short time.

The number of passengers and tons of freight carried was:

	1877.	1876.	Inc. or Dec.	P. c.
Passengers	1,149,376	1,162,242	D. 12,866	1.1
Tons freight	1,231,897	1,129,108	I. 102,719	9.1
Average receipt per passenger	5s. 1½d.	5s. 3½d.	D. 0s. 2d.	3.1
Average receipt per ton	11s. 3d.	9s. 9¾d.	I. 1s. 5¼d.	14.6

The car mileage showed an increase of 6,602,416 miles, or 8.9 per cent. Passenger receipts decreased £13,939, or 4.5 per cent., while freight showed a gain of £138,513, or 24.9 per cent.

The disposition of net earnings was as follows:

Net earnings, less postal and military revenue		£239,441
Rental Atlantic & St. Lawrence	£52,543	
Lewiston & Auburn	1,850	
Detroit Line	11,250	
Montreal & Champlain (interest)	11,571	
Buffalo & Lake Huron	34,500	
Total rentals	£111,714	
Interest on equipment bonds	30,000	
Interest on perpetual debenture stock	40,907	
Interest on lands, debentures, loans, etc	7,569	
		190,190
Surplus for the half-year		£49,251

The amount forward from the last half-year was £702, making £46,953 available for dividend. Out of this a dividend of 1½ per cent. was paid on the first preference stock, March 1, 1879. This required £48,225, leaving a balance of £1,728 to the account of the current half-year.

St. Louis & San Francisco.

This company was organized Sept. 7, 1876, by the purchasers at foreclosure sale of the property of the Atlantic &

Pacific Company in Missouri. It owns the road from Pacific, Mo., 37 miles west of St. Louis, southwest to the line between Missouri and the Indian Territory, 292.5 miles, and it holds by purchase or exchange nearly all the securities of the Atlantic & Pacific Company, which is still nominal owner of the 34.5 miles from the Missouri line west to Vinita, and of the franchise, etc., for an extension west to the Pacific. The whole line from Pacific to Vinita, 327 miles, is worked by the company. The report is for the year ending Dec. 31.

The equipment consists of 28 engines; 8 passenger, 1 sleeping, 4 mail and smoking and 4 baggage cars; 261 box, 259 stock, 185 ore, 10 flat and 17 caboose cars; 1 directors' car, 1 pile-driver, 1 tank car and 4 boarding cars.

The general account is as follows:

Common stock	$8,069,200.00
Preferred stock	9,507,100.00
First preferred stock and scrip	3,713,308.00
Total stock ($72,785 per mile)	$21,289,608.00
Bonds ($18,048 per mile)	5,278,982.26
Sundry accounts	231,400.14
Balance of income	143,933.83
Total ($92,116 per mile)	$26,943,924.23
Franchises and property ($91,401 per mile)	$26,734,718.15
Assets, cash, etc	209,206.08
	$26,943,924.23

In addition to the bonded debt given above, there are $7,194,500 of the old South Pacific bonds, subject to which the road was sold, making the total bonded debt $12,473,282.26 or $42,644 per mile. Of the bonds given above $313,000 were sold to pay for improvements, etc.; the other bonds and the stock were issued in exchange for similar securities of the old company. The company has in its treasury $187,000 bonds reserved for sale, and $255,000 bonds and $4,069,000 stock for exchange for securities of the old company still outstanding.

The company has a considerable land grant, from which are reported for 1877 net sales of 23,261 acres for $110,198.55. In all up to the close of the year 618,483 acres had been sold and 613,121 remained on hand of the grant of 1852; 207,286 acres had been sold, and 302,654 remained of the Atlantic & Pacific grant of 1866.

The earnings for the year were as follows:

	1877.	1876.	Inc. or Dec.	P.c.
Freight	$1,023,909.89	$965,775.03	I. $58,134.86	6.0
Passengers	230,242.57	239,257.98	D. 9,015.41	3.8
Expr. and mail.	54,121.03	56,561.47	D. 440.44	4.3
Rents, etc	15,670.27	111,064.40	D. 95,394.13	85.9
Total	$1,323,943.76	$1,372,658.88	D. $48,715.12	3.5
Working exps.	584,816.91	697,611.51	D. 112,794.60	16.2
Construct'n and equipment	61,505.44	61,327.97	I. 177.47	0.3
Taxes	27,250.21	33,206.70	D. 5,956.49	17.9
Total	$673,572.56	$792,146.18	D. $118,573.62	14.8
Net earnings	$650,371.20	$580,512.70	I. $69,858.50	12.0
Gross earn. per mile	4,048.76	4,194.52	D. 145.76	3.5
Net earn. per mile	1,988.91	1,772.05	I. 216.86	12.0
Per cent. working expenses	44.17	50.82	D. 6.65	13.1
Per cent. all expenses	50.88	57.71	D. 6.83	11.8

The decrease in gross earnings was chiefly caused by the absence of credits for rental of cars under a contract which has been terminated by the company as unprofitable, and the cars sold.

The work done was as follows:

Train mileage:	1877.	1876.	Inc. or Dec.	P.c.
Passenger	258,108	241,606	I. 16,502	6.8
Freight	546,816	516,638	I. 30,178	5.8
Service	12,151	22,722	D. 10,571	4.7
Total	817,075	780,966	I. 36,109	4.6
Mileage of pass. train cars	894,147	816,310	I. 77,837	9.5
Mileage of freight cars	7,168,379	6,620,170	I. 548,209	8.3
Passengers carried	55,736			
Passenger mileage	5,063,313			
Tons freight carried	254,386			
Tonnage mileage	39,824,417			
Average train load:				
Passengers, number	27.77			
Freight, tons	72.83			
Average rate:				
Per passenger per mile	4.54 cts.			
Per ton per mile	2.57 "			

Locomotive service cost 15.64 cents per mile. The average earnings per train mile were $1.6448: net earnings, $0.9183. Earnings per car mile, 16.42 cents; net earnings, 9.17 cents.

During the year 26½ miles of track were laid with steel; 172,932 ties were renewed and 32½ miles of road ballasted; 1,454 feet of new bridging built and other repairs made. The road and bridges are in good condition.

The income account from the organization of the company Sept. 5, 1876, to Dec. 31, 1877, is as follows:

Gross earning		$1,831,511.28
Expenses and taxes	$908,24[illegible].65	
Bonded interest and premium on gold	734,740.91	
Organization expenses, etc	44,591.89	
		1,687,577.45
Balance		$143,933.83

The company has sold $387,000 bonds for $301,882.22, the proceeds being used in improvements and settlement of liabilities. The sum of $184,086.23 has been paid from earnings on account of obligations (interest, etc.) prior to the organization of the company.

Great Western, of Canada.

This company's report covers 511 miles of road, the Main Line, from Windsor to Suspension Bridge, 229 miles; the Loop Line, from Glencoe to the International Bridge, 146 miles; 121 miles of branches owned, and 15 miles of the Welland Railway used as a connection between the Loop Line and Suspension Bridge. The company also works under lease the Wellington, Grey & Bruce, 168 miles; the London, Huron & Bruce, 69 miles; the London & Port Stanley, 24 miles; the Galt & Guelph, 15 miles, and the Brantford, Norfolk & Port Burwell, 21 miles, but only the net result from these 297 miles of leased lines are reported. The report is for the half-year ending Jan. 31, comparisons being made with the corresponding half of 1876.

Charges against capital account for the half-year were £471,012, principally for discount on shares issued. The arrangements for replacing the terminal bonds have been completed; £219,400 of the new 7 per cent. bonds were taken up in October, and £350,000 new 5 per cent. perpetual debenture stock (out of a total issue of £571,161 authorized) have been subscribed for at 80, to be paid in installments.

Arrangements with the Detroit & Milwaukee bondholders, as referred to in former reports, have been nearly completed, and the shareholders are asked to ratify the agreement. An agreement has been concluded to buy all the stock of the Galt & Guelph for $12,000, and that line will be worked as part of the Great Western system proper, as soon as the contract is ratified. The Brantford, Norfolk & Port Burwell has been added to the system of leased lines.

The earnings for the half-year were as follows, American currency being reduced to gold basis:

	1877-78.	1876-77.	Inc. or Dec	P. c.
Gross earnings	£467,237	£401,628	I. £65,609	16.3
Working expenses	295,274	313,715	D. 18,441	5.9
Net earnings	£171,963	£87,913	I. £84,050	95.6
Interest on bonds and debentures and loss on leased lines	98,795	95,688	I. 3,107	3.2
Surplus or deficit	£73,168	£7,775		
Renewal funds	23,540	25,848	D. £2,308	8.9
Net surplus or deficit	£49,628	£33,623		

After deducting the debit balance of £3,196 from the previous half year, and the £25,288 for interest for one year on debenture stock, there remains £21,144, from which it is recommended that a dividend of 0⅝ per cent. be paid on the ordinary shares, leaving a balance of £2,478 to the next half-year.

The increase in freight traffic was 79,103 tons—50,101 through and 29,602 local—and the increase in freight receipts £87,435. There was a decrease of 27,790 passengers and of £21,785 in passenger earnings, and a decrease of £41 in mails and miscellaneous. There was not only a gain in freight traffic, but rates were much better than in 1876. The earnings, reduced to American currency, were $4,544 gross and $1,673 net per mile. The loss on currency was much diminished, the average rate having been 102.7. The working expenses were 63.19 per cent. of earnings, against 78.11 per cent. in 1876. The earnings and expenses per train mile for seven half-years have been as follows:

Half-year ending:	Earn.	Exps.	Net. earn.	P. c. of Exps.
Jan. 31, 1875	6s. 8¼d.	4s. 11¾d.	1s. 8½d.	74.38
July 31, 1875	4s. 11¾d.	4s. 6d.	0s. 5¾d.	90.32
Jan. 31, 1876	5s. 7d.	3s. 11½d.	1s. 7½d.	70.99
July 31, 1876	4s. 10¼d.	3s. 6¾d.	1s. 3½d.	73.63
Jan. 31, 1877	4s. 9d.	3s. 8½d.	1s. 0½d.	78.11
July 31, 1877	4s. 9½d.	3s. 6¾d.	1s. 2¾d.	74.41
Jan. 31, 1878	5s. 2½d.	3s. 3½d.	1s. 11d.	63.19

Charges to reserve funds have been made on the basis approved by the stockholders, but no part of the amounts suspended last year has yet been charged up. The balance to credit of these funds is £158,678.

The loss on leased lines was £8,233 against £12,627 in the corresponding half of 1876. Leased lines suspense account was increased by renewal of bridges on the London & Port Stanley, the cost to be spread over several years' accounts.

Richmond & Petersburg.

This company owns a line from Richmond, Va., to Petersburg, 22.50 miles, with a branch to Port Walthall, 2.75 miles, making 25.25 miles in all. Its 43d annual report covers the year ending Sept. 30, 1877.

The equipment consists of 7 engines; 8 passenger and 5 baggage and mail cars; 37 box, 2 stock, 20 flat and 90 coal cars; 18 construction cars.

The general account is as follows:

Stock ($39,945 per mile)		$1,008,600.00
Bonds ($8,798 per mile)		222,138.41
Accounts and balances		24,891.10
Profit and loss		92,337.94
Total ($53,385 per mile)		$1,347,967.45
Property accounts ($51,884 per mile)	$1,310,066.54	
Company's stock	5,600.00	
Cash and accounts due	32,300.91	
		1,347,967.45

The funded debt was decreased by $14,658 during the year. The earnings for the year were as follows:

	1876-77.	1875-76.	Inc. or Dec.	P. c.
Passenger and mail	$75,587.10	$84,731.51	D. $9,144.41	10.8
Freight, etc	61,529.13	52,675.52	I. 8,853.61	16.8
Total	$137,116.23	$137,407.03	D. $290.80	0.2
Expenses	89,844.96	77,312.22	D. 12,533.74	16.2
Net earnings	$47,271.27	$60,094.81	D. $12,823.54	21.3
Gross earn. per mile	5,430.35	5,441.86	D. 11.51	0.2
Net earn. per mile	1,872.13	2,379.99	D. 507.86	21.3
P. c. of exps	60.55	56.27	D. 4.28	7.6

Interest paid was $21,520.64, leaving a balance of $25,750.63, from which a dividend of 2 per cent. has been declared since the close of the year. The work of the year was as follows:

	1876-77.	1875-76.	Inc. or Dec.	P.c.
Train mileage, passenger	35,482	35,224	I. 258	0.7
Train mileage, freight	30,614			
Total	66,096			
Passengers carried	107,821	115,020	D. 7,199	6.3
Passenger mileage	2,097,594	2,238,173	D. 140,579	6.3
Tons freight carried	80,814	85,827	D. 5,013	5.8
Tonnage mileage	1,576,263	1,475,359	I. 100,904	6.8
Av. pass. train load, No	59.12	63.54	D. 4.42	7.0
Av. freight train load, tons	51.49			

The total locomotive mileage was 93,087 miles, at a cost of 14.33 cents per mile; mileage of passenger train cars, 244,593; freight and coal cars, 313,447. The average receipt per passenger per mile was 3.603 cents; per ton per mile, 3.91 cents. The avergage receipts per train mile were $2.07; expenses, $1.36; net earnings, $0.71.

There were laid during the year 450 tons of new steel rails and an unusual number of ties; the James River bridge was repaired and a new roof put on it, and other extensive repairs made; the road was new ballasted with gravel. The board considered it better to make these repairs and to put the road in good order before resuming dividends. The increased renewals account for the increase of expenses.

Worcester & Nashua.

This company owns a line from Worcester, Mass., to Nashua, N. H., 45.69 miles, and leases the Nashua & Rochester road, from Nashua to Rochester, 48.81 miles, making 94.50 miles in all. There are 16.83 miles of second track and 13.79 miles of sidings on the line owned. The report is for the year ending Sept. 30, 1877. The Nashua & Rochester road has been worked since April 1, 1876.

The equipment consists of 20 engines and 3 snow-plows; 19 passenger, 3 parlor and 7 mail and baggage cars; 238 box, 100 flat and 100 coal cars.

The general account is as follows:

Stock ($39,173 per mile)		$1,789,800.00
Bonds $21,887 per mile)		1,000,000.00
Bills and accounts payable		106,384.39
Profit and loss		220,862.83
Total ($68,222 per mile)		$3,117,047.22
Road and equipment ($55,298 per mile)	$2,526,565.74	
Nashua & Rochester stock	475,300.00	
Cash, materials, balances due	115,181.48	
		3,117,047.22

The earnings for the year were as follows:

	1876-77.	1875-76.	Inc. or Dec.	P. c.
Passengers, etc	$208,941.17	$208,783.29	I. $157.88	0.1
Freight	288,297.97	280,915.80	I. 7,382.17	2.6
Rents	5,784.70	56,266.59	D. 24,621.89	43.7
Dividends	25,860.00			
Total	$528,883.84	$545,965.68	D. $17,081.84	3.1
Expenses	339,979.23	344,728.33	D. 4,749.10	1.4
Net earnings	$188,904.61	$201,237.35	D. $12,332.74	6.1
Gross earnings per mile	5,596.65	7,807.32	D. 2,210.67	28.3
Net earnings per mile	1,998.88	2,877.70	D. 878.82	30.5
Per ct. of expenses	64.28	63.14	I. 1.14	1.8

The Nashua & Rochester was worked for only one-half of the year 1875-76. The earnings of that road last year were:

Gross earnings ($1,965 per mile)	$95,932.21
Expenses (54.91 per cent.)	52,654.13
Net earnings ($887 per mile)	$43,278.08

With more than half the mileage, the leased line supplied only 18.1 per cent. of the gross, and 22.9 per cent. of the net earnings. The net earnings were $73,445.92 less than the rental paid.

The disposition of net earnings was as follows:

Net earnings		$188,904.61
Interest paid	$67,598.26	
Rental of Nashua & Rochester R. R.	116,724.00	
		184,322.26
Balance to profit and loss		$4,582.35

The sum of $69,271.42 was also received from the Boston, Barre & Gardner for land damages, etc., at Worcester, of which $13,747.54 was expended for construction last year, and the balance credited to construction account.

The work done was as follows:

Train mileage:	1876-77.	1875-76.	Inc. or Dec.	P. c.
Passenger	209,769	172,793	I. 36,976	21.4
Freight	158,555	146,432	I. 12,123	8.3
Service	12,025	9,706	I. 2,319	23.9
Total	380,349	328,931	I. 51,418	15.6
Passengers carried	336,354	346,800	D. 10,446	3.0
Passenger mileage	6,383,990	5,275,909	I. 1,108,081	21.0
Tons freight carried	315,267	303,922	I. 11,345	3.7
Tonnage mileage	10,063,658	8,969,245	I. 1,094,413	12.2
Average train load:				
Passengers, number	30.43	30.53	D. 0.10	0.3
Freight, tons	63.45	61.27	I 2.18	3.6

The traffic was equivalent to 92.5 passengers and 145.9 tons of freight carried each way daily over the whole length of road.

During the year the renewals have been 600 tons of steel rails, 100 tons of iron rails and 16,441 new ties. The work of extending the road and changing the terminus at Worcester is completed; the board consider this a needless expense forced on the company.

The Nashua & Rochester business is improving, but the line has suffered from low freight rates caused by competition.

Providence & Worcester.

This company owns a line from Providence, R. I., to Worcester, Mass., 43.41 miles; the East Providence Branch, 7 miles, and the Worcester Depot Branch, 1 mile, making 51.41 miles with 30.65 miles second track and 22.50 miles of sidings. It leases the Milford & Woonsocket road, 3.88 miles, and the Hopkinton road 11.55 miles making 15.43 miles leased and 66.84 worked. The report is for the year ending Sept. 30, 1877.

The equipment consists of 30 engines, 41 passenger train cars and 1,280 freight cars.

The balance sheet is as follows:

Stock ($38,903 per mile)		$2,000,000.00
Bonds ($9,726 per mile)		500,000.00
Notes payable		1,438,000.00
Unclaimed dividends		3,360.00
Total ($73,794 per mile)		$3,941,360.00
Road and equipment ($69,118 per mile)	$3,691,585.04	
Cash, materials and balances	247,914.12	
Profit and loss	1,860.84	
		3,941,360.00

Since the close of the year an issue of $2,000,000 consolidated bonds has been authorized. Of these $500,000 are reserved to replace the old bonds; $650,000 have been sold at a premium and the money used to pay floating debt, and $850,000 are on hand for future use for the same purpose. Equipment account was reduced $40,339.35 to cover depreciation.

The earnings for the year were as follows;

	1876-77.	1875-76.	Inc. or Dec.	P. c.
Passengers	$324,106.98	$340,231.51	D. $16,124.53	4.7
Freight	564,008.77	537,197.47	I. 26,811.30	5.0
Mails, express, etc	21,895.33	21,675.52	I. 219.81	1.0
Total	$910,011.08	$890,104.50	I. $10,906.58	1.2
Expenses	659,335.87	668,123.28	D. 8,787.41	1.3
Net earnings	$250,675.21	$230,981.22	I. $19,693.99	8.5
Gross earn. per mile	13,614.77	13,451.59	I. 163.18	1.2
Net " "	3,750.35	3,455.73	I. 294.62	8.5
Per cent. of exps	72.45	74.31	D. 1.86	2.5

The income account for the year was as follows:

Net earnings		$250,675.21
Decrease of cash and property accounts		64,767.14
Total		$315,442.35
Rentals	$10,980.00	
Interest	118,420.39	
Dividend, 4 per cent	80,000.00	
New construction	26,144.01	
Notes payable paid	52,000.00	
Increase in accounts	27,897.95	
		315,442.35

The traffic for the year was as follows:

	1876-77.	1875-76.	Inc. or Dec.	P. c.
Train mileage:				
Passenger	223,520	237,680	D. 14,160	6.0
Freight	336,226	283,565	I. 52,661	18.6
Service	17,035	13,150	I. 3,885	29.4
Total	576,781	534,395	I. 42,386	7.9
Passengers carried	1,570,068	1,585,393	D. 15,325	1.0
Passenger mileage	13,592,849	13,516,687	I. 75,692	0.6
Tons freight carried	641,135	555,960	I. 85,175	15.3
Tonnage mileage	18,862,705	17,192,076	I. 1,670,629	9.7
Average train load:				
Passengers, number	60.82	56.87	I. 3.95	6.9
Freight, tons	56.11	60.63	D. 4.52	7.5
Average receipts:				
Passenger, per mile	2.31 cts.	2.52 ct.	D. 0.21 ct.	8.3
Per ton, per mile	2.99 "	3.53 "	D. 0.54 "	15.3

The traffic was equivalent to 279 passengers and 387 tons of freight carried each way daily over the whole length of road worked.

The improvements at Worcester are nearly completed. Better accommodations are needed for freight business in Providence, in order that it may be more quickly and cheaply handled. Some increase of business has been received from the connection with the new Rhode Island & Massachusetts road at Valley Falls.